



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

3 3433 06633107 9

1. Science - Popular works,
1856.

XX

Adams
2-0A

1871

1871

PREFACE.

THIS little book is designed to convey to the youthful mind a knowledge of the nature and uses of the COMMON THINGS OF THE SEA COAST, and to cultivate in the young habits of *observation* and *reflection*. It is written, as the author believes, in a religious spirit, and calculated, as he hopes, to be of service to those for whom it is intended.

In order that it may be used as a LESSON Book by teachers, numerous questions are appended to each section, and the meanings of the scientific terms, which are necessarily introduced, are explained by a reference to their derivatives.

H. G. A.

ROCHESTER, 1856.



Not in R.D.
10/9-26
W.P.

THE
SEA-SIDE LESSON BOOK:

DESIGNED TO CONVEY TO THE YOUTHFUL MIND
A KNOWLEDGE OF THE NATURE AND USES
OF THE
Common Things of the Sea Coast.

1

IN A SERIES OF FAMILIAR DESCRIPTIVE CHAPTERS; WITH QUESTIONS
FOR EXAMINATION, AND EXPLANATIONS OF THE MEANINGS
OF THE SCIENTIFIC TERMS.

BY
H. G. ADAMS,
AUTHOR OF "THE YOUNG NATURALIST'S LIBRARY," "FAVOURITE SONG BIRDS,"
"STORY OF THE SEASONS," ETC., ETC.

LONDON:
GROOMBRIDGE & SONS, PATERNOSTER ROW.

MDCCCLVI.

W.S.M.

together, and let the dry land appear; and it was so. And God called the dry land earth, and the gathering together of the waters called He SEAS."

If we look at a map of the world, we shall see that about three-fourths of the whole surface is covered with water, more or less surrounded and divided by land. We shall also observe that different names are given to these bodies of water: some, the largest, being called OCEANS, others SEAS; those which run up into the land a short distance are GULFS or BAYS; narrow channels which connect two larger bodies of water are STRAITS; those are LAKES which are entirely surrounded by land; and those RIVERS, which go winding far inland, it may be hundreds of miles, forming sometimes the boundaries between neighbouring nations, at others the principal means of communication between those divided by long distances from each other. These highways of commerce, and sources of fertility, have their origin in inland springs, or lakes, or in the snows *that* gather about the peaks and amid the *hollows of* lofty mountains, and are melted by *the summer* sunshine. Like the other bodies *of* water mentioned, they vary greatly in size;

the largest known, the Mississippi, in America, being in length above 3000 miles, while the Thames, the largest English river, is but 240 miles long. *Oceanic* rivers are those which flow into the sea ; those which run into a lake, or some other river, are termed *tributaries*, *affluents*, or *feeders*.

That is the *source* of a river where it takes its rise ; the portion of country drained by it is called its *basin*, because it is usually of a hollow shape. Small water-courses we term *brooks*, *streams*, and *rivulets*, and several of these united form a *river*, of which, again, there may be many which run into one channel, and make what is termed the *principal river*, whose true source it is often difficult to determine, on account of these numerous tributaries.

The cavity through which a river flows is called the *bed* ; this may be either soft or hard, deep or shallow, according to the nature of the soil, and the swiftness of the current, whose course is bounded on either side by the *banks*. These are in some places steep and high, in others low and sloping ; they may be clothed with vegetation, or bare and barren, although usually trees and plants grow and flourish there in great beauty and profusion.

A river generally takes its rise in some mountainous region, or table land far above the level of the sea, into which it empties itself, and the swiftness of the current is in proportion to the steepness of the descent down which it flows. Geographers—that is, those who describe the surface of the earth—sometimes speak of the *upper*, *middle*, and *lower* courses of a large river. The first is where it passes through the high or mountain land of its source, and here it often rushes with great force and swiftness down precipices and sudden descents, in what are called WATERFALLS and CATARACTS. The middle course lies through hilly districts, which border upon the mountains; here it is often still rapid and turbulent, but not so much so as higher up, and the nature of the ground frequently causes the channel to wind considerably. The lower course lies usually through broad level plains, thickly peopled and highly cultivated, and here the current, meeting with few obstacles, turns this way and that, following what would be called a *serpentine* or *meandering* course; the latter word *being derived from the name of the Greek river Meander, which is remarkable for this twisting and winding about, as though it did not like to*

leave the beautiful scenery of its birth, to be swallowed up in the great wide sea.

The *mouth* of a river is that part where the waters are discharged into the ocean, and here it frequently divides into several branches, or spreads out to a greater extent. Thus the Thames, which at London Bridge is not above 700 feet wide, is at the Nore, where it meets the sea, six miles wide.

Some rivers overflow their banks at certain seasons, or periods; this is the case with the Nile. Such overflows are caused by the yearly melting of the snows, or the fall of large quantities of rain, perhaps hundreds of miles away from the land where the *inundation*, as it is called, takes place. In hot, dry countries, like Egypt, this turning the rice and corn fields into lakes for a time, is looked for, and hailed as a great blessing, as indeed it is; the earth is moistened and enriched by the deposit left when the waters retire, and the grain springs up and ripens in a wonderfully short space of time.

But there are also occasional inundations, which cannot be foreseen or guarded against, and which do immense mischief, destroying both life and property to a lamentable extent.

Tidal rivers are those which are influenced by the flowing and ebbing of the tide of the sea into which they empty themselves; in the Amazon, in South America, this is said to be the case at a distance of 500 miles from the mouth. Most rivers are *navigable*, that is, can be ascended in ships of considerable size, almost as far as the tide flows, some few farther, but many not nearly so far.

Into some rivers the tide, at certain periods, rushes with such violence as to produce what is called a *bore*, the water lifting itself up like a mighty wave, and rolling in against the current with great force, and a noise like thunder. The Severn, the Trent, and the Wye, are the English rivers in which this takes place; also in the Solway Frith, which runs up between England and Scotland about forty miles, and is more than twenty miles wide at the mouth. *Frith* or *forth* is the Scottish name for an *estuary*, or inlet of the sea; on the western coast of Scotland they would term this a *loch*; in Denmark and Norway, it would be called a *fjord*. These terms come from the Latin word *fretum*, which means a narrow sea between two lands. The word *gulf* has much the same meaning. *Bay* is usually applied to a

wider and shallower inlet. A *creek* is smaller, generally indenting a low coast, or river brink ; in North America, this term is often applied to small inland streams. A *cove* is a small creek or bay ; and a *haven*, or *harbour*, a place of shelter for ships, it may be of natural formation, or contrived and built by man ; very commonly it is in a good natural situation, strengthened and improved by art. If we dig a hole in the sand when the tide is out, it will soon be filled with water, and we shall have a LAKE on a small scale ; it may be of any shape, for lakes differ as much in this respect as they do in size. They are sometimes so large that they are called seas ; the Caspian Sea, for example, situated between Europe and Asia, has a length of about 900 miles, and an average width of 200 miles ; its waters are salt, and so are those of many lakes. The largest European lake, is that of Ladoga, in Russia, containing an area of 6330 square miles. There are many lakes in Great Britain, but they are all comparatively small : the largest in Ireland is Lough Neagh ; in Scotland, Loch Lomond ; in England, Windermere, in the county of Westmoreland. *Lough*, *loch*, and *mere* are different names of the same signification. The word *tarn*, which

also means a bay, fen, or marsh, is sometimes applied to a lake, generally of small size, and lying high among mountains.

A *lagoon* is a kind of lake formed by the encroachment of a sea or large river upon the land; the waters have flowed over into a hollow place, and there remained, kept up to their level by continued contributions in the same way, or through openings in the intervening bank; or it may be a portion of the sea, or river, cut off by a sand-bank, or coral reef, which has formed gradually, and entirely enclosed the space, or left but a small opening at one, or each end, or here and there along the ridge. What is called the Sea of Haarlem, in Holland, is but a vast lagoon. *Pools* and *ponds* are mere collections of rain-water in hollow places, which usually dry up in the hot season; this true lakes do not, as they are fed by streams flowing into them, or springs gushing up from the bottom. From lakes, of the latter kind, which often lie very high, some of the largest rivers take their rise; such, for instance, as the Volga, in Russia, which has a course of 1900 miles

Some lakes are fed by water making its way through the earth, or by underground passages, from a neighbouring large body of water, as

our supposed hole in the sand is supplied from the sea.

Some lakes are exceedingly deep, never having been fathomed, others are shallow ; some have sprung into existence within the memory of man, others are so old that they are supposed by some to be the remains of the great Deluge, when, for the sins of mankind, as we are told in Genesis, chapter vii., God "broke up the fountains of the great deep, and opened all the windows of heaven," so that the whole face of the earth was covered with water, and only the faithful Noah and his family were saved from destruction.

Lakes are great sources of fertility to the countries amid which they are situated ; the water drawn up from their surface, or evaporated by the sun, forms clouds, which ascending to the higher regions, where the air is colder, becomes condensed, or turned from vapour into water again, and falls as rain over a wide extent of land. When the poet made the cloud sing—

"I bring fresh showers for the thirsting flowers
From the seas and the streams"—

he might have added from the lakes also, for they supply much of the moisture which freshens the plants, and makes the earth productive.

Now if we dig a narrow channel from our hole in the sand out to the sea, we shall have a river flowing from, or into, a lake; or if we make another hole, and a channel between the two, it will be two lakes connected by a river, as is sometimes the case; fancy the whole on a larger scale, and it will be two seas joined by a *strait*, like that at Dover, which, forming part of the English Channel, serves to connect the Atlantic Ocean with the North Sea.

The term OCEAN is as commonly used to denote the whole immense mass of water which covers so large a portion of the globe, as it is applied to distinct portions of it, such as the Pacific, Atlantic, Indian, Arctic, Antarctic Oceans. Of these the Pacific is much the largest, covering a space equal to about half of the earth's surface; the Atlantic is the next in size, and the one with which we are best acquainted, as it washes the whole of the western shore of Britain; along the eastern coast we have the North Sea, or, as it is sometimes called, the German Ocean, which uniting its waters *with those of the Atlantic, extends northward, until it meets the great Northern, or Arctic Ocean, in the regions of everlasting winter; of seals and whales, and icebergs like floating*

mountains, beset with gems. The term SEA is also applied to the whole collective body of water, as well as to parts thereof, that is, the salt water; for we never call that a sea of which the water is fresh, however large it may be.

Why the waters of the seas and oceans should be salt has never been very clearly explained. Chemists can analyse it—that is, find out of what it is composed—but no one can give a satisfactory reason for there being so much muriate of soda, or common salt, and other chemical substances, held in solution by a certain quantity of it; these substances make it much heavier than fresh water, so that bodies thrown into it do not sink so readily. If one accustomed to bathe in the sea goes into a river, where the water is fresh, he finds that it requires greater exertion to keep himself on the surface; those creatures, also, which are accustomed to swim and breathe in the one, cannot, except in some rare instances, do so in the other. Salt has, we know, a *conservative*, or preserving quality, and no doubt it was wisely ordained by God that it should be largely diffused through the ocean, where there is constantly so much dead animal matter, whose too rapid decay would render the surrounding fluid unfit to sustain

animal life. When death occurs on land, the body is generally buried in the earth before decay commences; but this cannot be the case in the sea, and although there are plenty of voracious creatures to act the part of scavengers of the deep, as we shall presently learn, yet a considerable time must elapse before it is entirely consumed. The constant motion of the waves, too, tend to keep the waters fresh and pure; they roll, you will observe, over and over, exposing fresh surfaces to the air, which mingles with their particles, and furnishes them with that which is necessary to support animal life.

Another curious circumstance connected with the ocean is the greenish or bluish tint which it generally assumes, being darker at a distance from the land, and lighter towards the coast. As the waves roll and break upon the beach, scattering their sparkling foam in every direction, the water appears perfectly colourless; and at some distance out from the shore, if you look straight down, where there is no floating earthy or vegetable matter to give a colour to *the fluid, and obstruct the view, it seems as though you gazed through a perfectly clear medium; but cast your eye along the level of*

the ocean, and it will be quite different: if the sun is out, there will be a shifting play of lighter and darker tints of green and blue, intermingled with golden flashes of sunshine; if the sky be overcast, it will be a wide plain of dull green, against which the foamy crests of the rolling billows will show white as driven snow. In some parts, voyagers tell us, the sea appears of a beautiful ultramarine—that is, of a rich, deep blue colour; in others it is green as emerald, or a field of grass after a refreshing shower. For this variety of colour in the waters of the sea different causes have been assigned; such as the separation and reflection of the rays of light, the blue rays passing, it is said, more readily into the fluid, and being more or less changed by admixture with the sunshine, which is red and yellow. This is one explanation of the phenomenon, and it seems the most feasible. In some cases, no doubt, the colour of the water may be attributed to other causes; as, for instance, that of the Red Sea, which is owing to the presence of immense numbers of animalculæ, so small that they can only be seen with the help of a microscope. *Vegetable matter may also, in some instances, give a colour to the water, as well as clay and*

other soils washed from the shores, or discharged from the mouths of the large rivers; but in this case there will not be that transparency, or clearness, which gives to the water of the ocean its chief beauty, and enables the mariner, as he passes along the surface, to behold the wonders of the mighty deep, whose floor, the poet tells us, "is of sand like the mountain drift." Far down, perhaps thousands of feet, the eye beholds mountain and vale, forest, grove, and garden, rocky cave and sparry cell, with strange and beautiful shapes of animal life, swimming and sporting amid them, and a vegetation as various in form and rich in colour as that of the land, although totally different.

We have now to speak of the *ebbing* and *flowing* of the ocean, sometimes called its *flux* and *reflux*. As we walk along the shingly beach, we may observe that it slopes gradually down in terraces, as it were, ridge below ridge, until we come to what is called *low-water mark*, beyond which the waves rarely or ever retire; to reach this we have sometimes to pass over a large space of hard firm sand, than which there *can be no more* pleasant walking, except, it *may be*, the elastic greensward of a woodland *path*. In some cases, where the shore is not

very shelving, the ebb terminates at the lowest verge of the shingles, or perhaps considerably above it. A long irregular line of sea weed, that lies blackening in the sun, generally points out *high-water mark*, as does also a ridge of pebbles, steeper and more continuous than the rest. When the tide is out, we may measure the distance between these high and low water marks; it will vary greatly, as the shore is more or less sloping, but it is always considerable, and we may well ask ourselves why this space should at certain calculable periods—that is, twice in the twenty-four hours—be alternately covered with water, and left dry.

THE THEORY OF THE TIDES, as it has been called, has long occupied the attention of scientific men, who have shown in their writings that to the influence of the sun and the moon may be ascribed *fluxes*, or flowings up, and *refluxes* of the deep sea water; but chiefly to the latter luminary, on account of its being more near to the earth than the former. What are called *spring tides* are those in which the highest elevation of the water takes place; this occurs when the moon is new, or at the full, as then the sun is on the same plane of the meridian, which means that it is exactly above the same part of the earth's sur-

face. When the moon enters her second and fourth quarters, we have the lowest, or *neap tides*, the sun then acting in opposition to the moon. But, it may be asked, how do these heavenly bodies produce this effect upon the water? Simply by what is called the power of *gravitation*; that grand law which regulates the motions alike of the earth and all moving substances—that power which larger bodies possess of drawing to themselves smaller ones; so the moon and the sun draw up, or attract, the waters of the ocean, and cause them to rise above the surrounding level, forming what are called *tidal waves*, which flow in from the wide oceans and seas with more or less force and swiftness, in proportion to the power of the wind, and the obstacles which oppose their progress.

These tide-waves follow each other in rapid succession, and we often see them come rolling in upon the shore, amid foam and thunder, like swift runners who have striven to overtake each other, and are glad to throw themselves down at the end of their journey, anywhere, or any *how, for rest*. Sometimes they come so swiftly, *urged on by the sweeping blast*, that they leap *on each other's backs*, and come roaring in like

mountains that madly dash themselves to pieces, and scatter their fragments far over the surrounding land. And what a grand sight it is to see these huge billows, rearing their white crests high up towards the stormy sky, and threatening to overwhelm all within reach—grand, but fearful !

But WAVES must not be confounded with TIDES, although we speak of *tidal waves*; for the former are varying and occasional only, depending upon the action of the winds, while the latter are constant and regular in their recurrence. If we cast a stone into a pond, the water will be disturbed; there will be a depression where the stone sinks, and all around the water will be forced up into a circular ridge, which, sinking down, forces up another wider circle, and so the *undulating* motion goes on, until the limits of the pond are reached, and these are waves on a small scale. The wind acts upon the surface of the water precisely as the stone does, depressing it in one place, and so causing an elevation in another; only the wind having produced the disturbance, also keeps it up, to a greater or less degree, in proportion to its strength and violence; hence we have waves of all sizes, from the tiny ripples

that dance and sparkle in the sunlight, to the mighty *billows* that rush and roar, and do such terrible mischief.

And what is this useful and beautiful element called WATER, of which the seas and oceans, the lakes and rivers are composed? Everywhere do we see it, and use it, and enjoy it, as one of the greatest blessings given to man. Without it we should perish, we and all living creatures; all plants and herbs would fade and wither, but for water, and the world become a dreary, parched, uninhabitable desert. Chemists tell us that it is composed of two gases, called *hydrogen* and *oxygen*, in the proportion of two parts of the first to one part of the last. Here we see it in its *liquid*, or *fluid* state; above us in the clouds, or in yonder bank of fog, which stretches like a curtain across the valley behind us, it is presented in its *aeriform* or *vaporous* state; it is sometimes also *solid*, as in ice, snow, and hail, which is frozen rain. In every state it is beautiful; in every state beneficial to man. *Steam*—this is water expanded by heat; what mighty works are being effected *by its aid!* *Rain* and *dew*, which are condensed *vapour*, *how* is the earth freshened and *nourished by these!* Oh! we might say much about

water, in its various forms and combinations, from the tiny dewdrop, that hangs like a glittering diamond on the blade of meadow grass, to the mighty ocean, the great highway of nations, that stretches away thousands of miles, and encircles islands peopled by millions of human beings, and seeming, in proportion to its vast expanse, as mere specks upon the field of vision.

Such, then, is the MIGHTY DEEP—the grand, old, illimitable sea ! sometimes called an image of eternity, because it appears to be endless and boundless. How gentle and lovely is it, when it sleeps calmly in the summer sunshine ; how playful when it just tosses aloft its showers of glittering spray, and rocks the fisher's boat to and fro, and makes a low murmur, like a soothing lullaby. The children sport amid its waves, and have no fear of the slumbering giant, whose anger is so terrible, whose power and majesty so overwhelming.

“If a storm should arise and awake the deep,” ah ! then do we see how powerful and uncontrollable the ocean really is ; the great ship, with her huge timbers, all bolted and bound together with iron, is riven into a thousand pieces, and scattered far and wide over the angry waters. But did we say uncontrollable

Nay, this is not true. There is One who can still the stormiest waves, and make the most tumultuous billows yield a ready obedience, for "the sea is his and He made it, and his hands prepared the dry land."

QUESTIONS.

- What do you understand by the phrase, "*The Mighty Deep*?"
 What does the Psalmist say of it?
 Whereabouts in the Bible is the creation of the seas described?
 Repeat the passage.
 What proportion does the water bear to the land?
 Are oceans larger than seas?
 What are gulfs and bays?
 What are lakes?
 What are rivers?
 Where do rivers take their rise?
 Which is the largest river in the world, and what is its length and average breadth?
 Which is the largest English river, and how long is it?
 What are oceanic rivers?
 What are other rivers called?
 What is the source of a river?
 What its basin, and why is it so called?
 What are small water-courses termed?
 Why is it sometimes difficult to determine the true source of a river?
 What are its banks?
 To what is the swiftness of the current owing?
 How do geographers divide the course of a large river?
 What are waterfalls and cataracts?
 What do you call a winding course?
 Why do we say meandering?
 What is the mouth of a river?
 What character does a river generally assume at its mouth?
 What width is the Thames at London Bridge?
 What is the Nore?
 What river overflows its banks at certain periods?
- What are the causes of such overflows?
 What are they called?
 Are they beneficial to man?
 In what way?
 Where is the Nile?
 Are all inundations beneficial?
 What are tidal rivers?
 How far does the tide run up in the Amazon?
 Where is this river?
 What are navigable rivers?
 How far may they be ascended?
 What is a bore?
 What English rivers present this phenomenon?
 Where is the Solway Frith situated?
 What is its length and breadth at the mouth?
 What are the Scottish names for an estuary?
 What do they call it in Norway and Denmark?
 What is the Latin root of these terms, and what does it mean?
 What is a creek?
 What is a cove?
 What is a haven or harbour?
 How can we form a small lake?
 In what do lakes differ?
 Name the largest European lake.
 How many square miles does it contain?
 Are there many lakes in Britain?
 Name the largest in Ireland.
 In Scotland.
 In England.
 What are the different names applied to lakes?
 What is a tarn?
 What is a lagoon?
 How is it formed?
 What European Sea is properly a lagoon?

What are *pools* and *ponds*?

In what do they differ from lakes?

How are lakes fed?

From what kind of lakes do the

largest rivers take their rise?

Name one of these rivers, its country, and length.

Are lakes supplied in any other way than those just specified?

In what other respects do lakes differ?

What are the older lakes said to be the remains of?

Where in the Bible do we find a description of the Deluge?

In what way are lakes sources of fertility?

What would two holes dug in the sand, with a channel between, resemble?

What large bodies of water does the *Strait* of Dover connect?

What do you understand by the term *ocean*?

Name the principal oceans.

Which is the largest?

How much of the surface of the globe is covered by the Pacific?

With what ocean are we most familiar?

On which side of Britain does the Atlantic flow?

What sea washes the eastern coasts?

What is the North Sea sometimes called?

With what oceans do its waters unite?

What is meant by the term *sea*?

What bodies of fresh water ever meet seas?

What is the sea salt?

What is the chemical name of common salt?

Which is heaviest, fresh or salt water?

In which is it easiest to swim?

What peculiar property has salt?

What obvious advantage is there in salt?

What is the purpose of salt in the waters of the ocean?

What is the ocean?

What is the colour the deepest?

What effect has the sun on the waters?

How do they look when the sky is overcast?

What do voyagers tell us about the colour of the sea?

What appears to be the most likely cause of this variety of colour?

Are there any other causes?

Give an instance.

What effect has vegetable and earthy matter?

What is there at the bottom of the sea?

What other terms are there for the *ebbing* and *flowing* of the tides?

What do you mean by *low-water mark*?

Where is this situated?

On what does its distance from *high-water mark* depend?

How do we generally distinguish the latter?

How frequently do the tides ebb and flow?

What are scientific writers on this subject said to treat of?

To what influence do they ascribe the phenomena?

What does the word *flux* mean?

Does the moon exert the most powerful influence on the ocean?

Why the moon?

What are *spring tides*, and how are they produced?

What are *neap tides*, and when do they occur?

By what power or great law of nature do the sun and moon so act upon the waters?

What does this action produce?

What makes the *tidal waves* flow in with more or less power and swiftness?

In what do *waves* and *tides* differ?

How are the former produced?

Of what does water consist?

In what proportion are these gases?

Name the three states in which water is found.

What is *steam*?

What are *rain* and *dew*?

Is the ocean controllable, and by whom?

Repeat a Scripture passage which



SECTION II. *Ships and Boats.*

HAVING in our last section discoursed of the mighty deep, we will now speak of the different kinds of vessels made to float thereon; from the huge man-of-war down to the little fishing-boat. First let us inquire what is the meaning of the term SHIP. It is derived from the Saxon *scip*, or the Teutonic *schip*, and signifies, as Dr. Johnson says, "a large hollow building, made to pass over the sea with sails." But this definition will not do for us now, for we have steam-ships, of which there were none when Dr. Johnson wrote, and these, *although they generally carry sails, can, and do most frequently, pass over the sea without their aid.* So we will give a more extended

meaning to the term, and say that a ship, in a general sense, is any large vessel used for purposes of navigation; or, in a more particular sense, it is a vessel having three masts, each composed of three distinct portions, called the *lower*, *top*, and *top-gallant* masts: of these, and the other parts of a ship, we shall have to speak presently.

We will now glance as far back into the past as the light of history penetrates, and endeavour to trace the rise and progress of ship-building, or NAVAL ARCHITECTURE, a term derived from the Latin *navalis*, belonging to ships, and *architectus*, a builder.

The Ark, built at God's command by Noah, for the safety of himself and his family in the great Deluge, of which we read in Gen. vi. is the first large floating vessel spoken of in Scripture. We read also in Numb. xxiv. 24, of ships that should come from the coast of Chittim, to afflict Asshur and Ebor; and this is the earliest notice which we find of vessels employed for hostile purposes, or war ships. Again we are told (1 Kings xxii. 48) that Jehoshaphat made ships to go to Ophir for gold; "but they went not, for the ships were broken;" that is, probably, wrecked and destroyed

by the tempests. King Solomon was more fortunate with the ships which he sent to Tarshish; for we are told (2 Chron. ix. 21) that once in every three years they came back, bringing gold, and silver, and other products of the rich countries which they visited. These were the earliest merchant ships that we know of; unto them did the wise Solomon liken a virtuous woman, because she bringeth food from afar; that is, with the products of foreign lands, such as wool and flax, which are named (Proverbs xxxi. 14), she labours to increase her household store.

These ships of Tarshish and Chittim are several times alluded to by the Prophets. It will be a good Scripture exercise for my readers to find out the passages in which these allusions occur.

“The way of a ship in the sea” was one of the things which were wonderful even to Solomon, with all his wisdom; and his father David, when he contemplated “the great and wide sea,” exclaimed, in admiration, “there go the ships.” Allusion is several times made to *ships in the Gospels* and other parts of the *New Testament*; but the vessels so called in *which our Saviour* preached to the multitude

and slept during the storm, and to which he walked upon the waters, etc., were, no doubt, only large fishing-boats; nor is it likely that those spoken of in the Old Testament were larger than those vessels now employed in what is called the coasting trade, such as coal brigs and the like, several of which might be hoisted up, and put upon the deck of a man-of-war.

In works on ancient NAVIGATION—that is, the art or practice of conducting ships across the waters, the term being derived from the Latin *navigo*, to sail—we find that vessels passing from one country to another, for purposes of war or commerce, seldom ventured out of sight of the land, as no compasses, or other *nautical instruments*, were in use, to indicate the right track over the pathless deep. The word *nautical* comes from the Latin *nauticus*, belonging to ships or sailors; hence we call matters connected with navigation *nautical affairs*, and so forth; while that little fish with a pearly shell, that hoists a filmy sail, and puts out what look like oars, is called a *nautilus*.

But let us return to the early history of ships. The Greek poet Homer gives a poetical description of those which conveyed his countrymen to the siege of Troy, and although w

cannot tell what may be the admixture of truth and fable in his account, yet we may well suppose that he described such ships as he had seen, or otherwise knew to have been in use at the period referred to. These, like all the vessels of war used by the ancients, were called *galleys*; they were propelled by *oars*, worked by a great number of *rowers*, sitting often in *tiers*, *rows*, or *banks*, one above the other. The prophet Isaiah, we may remember, in his 33rd chapter, speaks of "galleys with oars," and this is the only place in Scripture where mention is made of galleys. Those of the Greeks and Romans, it appears, were often richly ornamented, having the *pro*w, or *beak*, as the bow, or foremost part, was called, carved into the representation of some object in nature, whose name the vessel bore; it is thought by some that many of the absurd legends in the Mythology (a collection of ancient myths or fables) arose out of this custom of naming a ship after the bird, or beast, or other natural object, which formed what we should now call its *figure-head*. Thus when we are told of certain imaginary personages, that they sailed about on winged dragons, and so forth, we are to understand that the monsters which bore them were only ships,

having the names and images of the supposed creatures.

Our great poet Shakespeare gives a magnificent description of the ship of state in which Cleopatra, queen of Egypt, went forth to meet the Roman conqueror Mark Antony; but whether such ships were ever built and employed by the Egyptian monarchs we cannot tell. Most countries that have a sea coast, or broad navigable rivers, have, and have had from very early times, their ornamented vessels for war, and state occasions; some of these have been described by travellers as very large and richly decorated. The *proas* and *canoes* of the most savage and barbarous tribes have generally some attempt at ornament about them; those of the New Zealanders, for instance, which we may see in almost any museum, and in many private collections of foreign curiosities, are often curiously and elaborately carved, and especially the *paddles*, or short broad *oars*, with which they are rowed. It is likely that the first attempts to put, as it has been sometimes said, "a saddle upon the waves" were mere *rafts*; such as Hannibal, the Carthaginian general, used to transport his horses and elephants across the Rhone, or such

as the people of Egypt employed for their general purposes of traffic up and down the Nile. These *rafts* were merely pieces of timber, lashed together with cross planks on the top; not much could be done in the way of guiding them, and being of a square or oblong form, they offered great resistance to the water, and could therefore only move very slowly, unless borne along by a swift current.

The Peruvians used a kind of raft, which tapered at the prow, to enable it the more readily to pass through the water; the planks were bound together with leather thongs, which becoming rotten, the whole structure sometimes fell to pieces, and sailors and goods disappeared beneath the waves. Immense rafts of timber are yearly floated down the Rhine, from the forests of Germany, to Dort in the Netherlands; they are sometimes a thousand feet long, and eighty or ninety feet wide, consisting of large tree trunks, secured together by iron spikes and cross timbers; they require as many as four or five hundred labourers to manage them, and look like floating villages. When arrived at their *destination*, they are broken up and sold, the *timber of a single raft* sometimes fetching as much as £30,000. The same plan of convey-

ing timber is adopted along the coasts of Norway, and down the large American rivers, where the *lumberers*, as the timber-cutters are called, go floating down for weeks and weeks, through the silent solitudes of nature, now scarcely moving in the sluggish current, now shooting down the rapids with fearful velocity, and spinning in the eddies like a wheel on its axis. It is supported on a slight kind of raft, that is, a couple of planks, which they manage with singular dexterity, that the Sandwich and other islanders in the Pacific Ocean dash through the heavy surf that breaks upon their coral reefs, and swim out to sea; right through the roaring waves they go, and come out on the other side with a shout and a laugh, which tells that they think it glorious sport; and when they wish to return to the shore, they mount upon the crest of a huge billow, as a strong rider mounts a fiery steed, and are shot in, taking care, however, so to guide themselves by means of their planks, as to avoid the rocks, against which they would be dashed to pieces. In like manner do the swarthy dwellers on the Indian coasts come out and return on their *catamarans*, as they are called, often landing passengers and goods, when they could get

shore by no other means. All, too, who have read of shipwrecks and disasters at sea, have heard of the raft, that last resource, and only hope, of those whom the waves threaten to devour; sometimes an ark of safety, but too frequently, alas! a floating sepulchre, and stage of suffering and horror, too great for words to tell. Then, as my young readers will, no doubt, remember, there was the raft on which Robinson Crusoe made repeated trips to the wreck, and saved so much that was most valuable, if not essential to his safety and sustenance, on his desolate island.

The *raft*, then, is the simplest kind of floating vessel, if we may so call it, ever used by man. Considerably in advance of this, in point of utility and ingenuity of construction, is the CANOE, which, in one form or another, is employed by all savage and uncivilized people, for crossing lakes or rivers, or passing from island to island. The canoe is, generally speaking, a single tree hollowed out, and rudely shaped into something like a boat; it is usually urged onward by what are called *paddles*—that is, *short broad oars*, sometimes not unlike a *spade in shape*, which are worked perpendicularly—that is, *straight down in the water*. It is

related of the Macedonians, that when they saw the natives of the islands about the mouth of the river Indus paddling in their canoes, they imagined them to be employed in the profitless labour of digging the sea with spades. The Greek traveller Herodotus describes a curious kind of vessel, used for conveying goods down the Euphrates to Babylon; it had a frame of willow, wrought together like our basket-work, and covered with skins, and resembled, when complete, a large tub, being nearly circular in form; it was managed by two men with long poles, who spun it along, without regard to stem or stern. Major Rennell, in his work on India, states that such a vessel is still used on the lower parts of the river Undie, under the name of the *kufah*, or round vessel. Very similar to this in construction was the *coracle* of the ancient Britons, which was so light that it might be carried on the back of the voyager, who feared not to trust himself to its frail support on the watery tracks he had to cross. The American Indian, in a light wooden-ribbed canoe, shoots the rapids of his native rivers and paddles across the lakes, some of the almost as large as seas. The Greenlander

his boat, ingeniously contrived to shut up the lower part of the body and keep out the water, hunts the seal and strikes the huge whale amid the bergs and floating fields of ice. On the stage, or platform, of their double-bodied canoe the Society-Islanders wage fierce warfare with hostile tribes; and the natives of the Ladrone Islands, in their swift *proas*, skim the seas at the rate of twenty miles an hour, on their errands of hate and revenge. The Swedish, or Scandinavian, boats seen by the navigators in the time of the Roman historian Tacitus, are described as having a double prow; they were peaked at both ends, as are the northern *yawls* of the present day; they were, no doubt, used for purposes of piracy, like too many of the similarly shaped Greek vessels of both ancient and modern times: such was the form, too, of the swift row-galleys of the Moors of Africa, who for several centuries kept the coast of the Mediterranean in a constant state of terror, plundering and slaying, or carrying away into captivity, the defenceless people on land, and seizing the cargo and crew of every *merchant ship* which they could surprise or overtake.

The vessels of which we have hitherto

spoken have been mostly those propelled by oars alone; of a higher order of naval architecture are those of which we have now to speak—SAILING VESSELS. That sails were used at a very early period there is abundant evidence to prove; they were probably first suggested to the mind by an observation of the action of the wind upon the extended wings of a bird, or the membranous fins of the flying fish; their form at first was very simple, and their material that which came most readily to hand. Thus Julius Cæsar observed that some of the barbarous tribes with whom he came in contact employed the skins of animals for this purpose, and to this day, hides undressed, or made into leather, are so used in some parts of the world. We read in the Mythology, that Hercules crossed the waters upon the back of a lion. The fable, no doubt, originated in the circumstance of some mighty Grecian, perhaps nothing but a pirate, or sea-robber, putting forth on his plundering expeditions in a vessel that had a lion's skin for a sail. Bark fibres twisted or woven together formed the sails of many early navigators; as they still do those of several uncivilized tribes. The native West Indians of the present day plait a sort of silks

grass into the required length and breadth, and suspend it to the mast by a cross yard of rude construction. The value of hemp and flax for the purposes of rope and sail making has long been known and appreciated, and the strong yet pliable canvas formed of the latter, is the only material now used for sails among civilized nations.

Let us say a few words here about those important products of vegetation, HEMP and FLAX. The botanical name of the hemp plant is *Cannabis sativa*; it grows with a hairy, squarish stem, six or eight feet high, and has long pointed leaves, being very different in appearance from the flax plant, the botanical name of which is *Linum*, derived, as some think, from a Greek verb signifying to hold, on account of its fibrous nature, which renders it capable of being twisted into cloth, cordage, etc.; from the above Latin name comes the term *linen*, which is made of flax, as cotton is of the plant so called. The flax fibres are much more soft and silky than those of the hemp, hence they are generally used for the finer fabrics. The plant *itself* has a round hollow stem, which grows to the height of about two feet, and then divides into several branches, each terminated, at the

proper season, with a pretty delicate blue flower, succeeded by a seed-pod; from the bright slippery seeds contained in these pods linseed oil is obtained by pressure, so that the plant is useful in various ways, as is also the hemp; but it is only in so far as they relate to the rigging and service of a ship that we have now to do with them.

Our largest supplies of both hemp and flax have hitherto come from Russia, that country sending more than two-thirds of the whole quantity imported, which is considerably more than *one million of hundred-weights* in a year; Prussia, Holland, and Belgium furnish the rest, with the exception of a small quantity from France, and, latterly, from Egypt. Within the last few years flax cultivation has been attempted in Ireland, with considerable success; so that we may soon hope to supply sails and cordage to our merchant and other ships, made from home produce.

We cannot here describe the process of preparing hemp and flax for the spinner and weaver. The *tow* and the *yarn*, as they are called, are the fibrous or stringy portions of the stalk, which are separated from the woody parts by soaking in water, and afterwards beating, and what is

called *scutching*. The conversion of the hemp into rope, and the flax into the fine string or the thread of which canvas is woven, is accomplished by machinery, whose construction and operations we hope to describe in future books devoted to the several branches of English manufactures. We will now consider that the sails are being shaped and prepared in the sail-loft, and the cables and smaller ropes in the rope house or ground, and proceed with our talk about ships.

It was not until the reign of Alfred the Great that the history of the British navy commenced, nor until that of Henry the Eighth that this nation took a prominent place as a maritime power. The vessels which Alfred built and equipped to oppose his northern invaders were, no doubt, superior in size and style of construction to any which had before been launched from these shores; yet were they mere tubs in comparison with what we should now call a respectable trading vessel. Even in the time of Richard the Second the war ships, of which we have representations, *were the queerest and most clumsy-looking affairs conceivable; almost as broad as long, shaped something like a foot-bath, no deck; a*

single stout mast, with a square thing like a lantern, which perhaps it was, on the top, kept in its place by eight thick ropes, four on each side; this was all the rigging; there was a single sail, very loose, fastened, at the bottom, to each side of the ship, and at the top to a cross yard, that, it seemed, could not be pulled above half-way up the mast, and was as likely to drop down as to keep in its position. It was in such a ship as this that Richard the Lion-hearted set sail for the Holy Land, leading the first fleet that ever left these shores on a foreign expedition. It was with five hundred such that King John fought, and won, the first naval battle between England and France; many of these were, no doubt, merchant vessels, seized and appropriated to the national service, or hired for the occasion. That this was no uncommon practice in early times we may learn from the recorded fact, that in 1253 Henry the Third ordered all the vessels in the country to be employed in an expedition against the rebels of Gascony: the fleet altogether amounted, we are told, to above a thousand ships, three hundred being of large size. So again in 1346, when Edward the Third laid siege to Calais, there were thirty-seven ships belonging to the king

thirty-seven foreign ships, one from Ireland, and 710 from the British ports, which were bound to furnish so many for the king's wars. It was in the reign of Edward the First (1297), that the first English admiral was appointed—his name was Roger de Leyburn; and in that of the third Edward, above alluded to, that we have the earliest mention of the use of the bowsprit, although in many of the ancient galleys, as well as the more modern ships of war, there appears to have been a projection at the prow, frequently with a pointed spear-like head, as if it were intended to do mischief to any object against which it might be forcibly driven; this head was usually carved into the representation of some bird or animal. Sometimes the prow of the vessel went straight up, half as high as the mast, like a neck, on the top of which the head was seated. The sides of the prow of an ancient ship were called the cheeks; they were frequently adorned with paint and gilding, the whole front sometimes forming a rude representation of a human face, with a preposterously long and ugly nose. That part of *the vessel which divided the water was termed the goose, from its supposed resemblance to the*

breast of a swimming bird; we now call it the *cutwater*.

What may properly be called the first ship of the British navy was built by Henry the Seventh, in 1488, at a cost of £14,000; it had three masts, and stood very high out of the water; it was accidentally destroyed by fire at Woolwich, in 1553. We have no record of the number of guns carried by this ship, nor of what is called her tonnage; the meaning of which term we shall presently explain.

The next large ship of which we read is the *Henri grâce à Dieu*—that is, Henry by the grace of God; it was built in 1515, at Erith, on the Kentish shore of the river Thames, between London and Gravesend. There is a picture of this ship in the Painted Hall, at Greenwich Hospital; it had four masts, and two full battery decks, with a shorter one at the head, which was raised very high, and most likely originated the term forecastle, still applied to that part of a ship of war in advance of the foremast. This ship carried eighty guns, of various sizes, and measured about 1000 tons burden. In 1552 the name was changed to "*The Edward*;" how long she was in existence after that date there is no record to prove.

"The Sovereign of the Seas" was the somewhat boastful title given to the next large English war-ship. She was built at Woolwich dockyard, in the year 1637, and was considerably larger than either of those before mentioned; she carried above 100 guns, upon three full battery, or gun decks, and two additional platforms, or short decks, at the head and stern; her estimated burden was 1680 tons. In her shape and general build, we have a nearer approach to the man-of-war of the present day; although, of course, great advances have been made in all that relates to naval architecture and navigation since the reign of Charles the First, when she floated proudly upon the waters, with the British standard flying at her mast-head, and flags and streamers decorating every part of her spars and rigging to which they could be attached.

Henry the Eighth has been termed the founder of the royal navy of Britain; by him were established the first large dockyards for the building and repairing of ships of war; he also made laws for the planting and preservation of timber, *nor did he neglect the mercantile marine, as the collective body of ships engaged in commerce is called; it was for the improvement*

and protection of this important branch of national industry, that what is termed the Trinity House was established in his reign, and under his patronage. This is a corporation, or body of persons who have authority to arrange and regulate affairs connected with merchant ships and seamen; pilots, lighthouses, harbour dues, and such matters, are what they have chiefly to do with. The charter of incorporation of this Society is dated in the sixth year of the reign of the above monarch. In the succeeding reign, that of Elizabeth, occurred that great triumph of the British navy, the defeat of the Spanish Armada, which gave to this country the undoubted pre-eminence as a maritime power: ever since then she has gone on increasing and strengthening her navy. Of her great and numerous victories upon the sea we have not space here to speak—the history of the last three centuries is full of them; and no more daring exploits have ever been performed by men than those recorded of our sea captains and commanders, and their hardy and adventurous crews, who only when afloat seem really upon their natural element. But it is with the *ships*, and not with those who build and man *them*, that we have now to do—with those

“ wooden walls of Old England,” of which the nation is so proud and confident, that it would rather trust in them for protection, than in the omnipotent arm of the Almighty.

It is under date 1546 that we first read of a classification of vessels adapted for war; they appear then to have been divided into four classes, as follows: *ships, galleys, pinnaces,* and *row-barges*. The first three had probably sails; the last was, of course, without, and might be of small size, like the larger boats of a man-of-war of our days. In the reign of Charles the First the royal navy was first divided into six rates, as at present, and each rate into two or more classes. At the death of George the First, that is, in 1727, the nation possessed one hundred and seventy-eight ships of war, which might be thus classified:—

First rates from 100 guns upwards, burdens about 1900 tons.				
Second	90 to 100	“	“	1400 “
Third	70 “ 90	“	“	from 1200 to 1400
Fourth	50 “ 70	“	“	800 “ 1000
Fifth	30 “ 50	“	“	400 “ 600
Sixth	20 “ 30	“	“	400 and less.

Men-of-war, or line-of-battle ships, are the names by which the first, second, and third rates are generally known. Fourth and fifth rates are called *frigates* of the first and second class. This term *frigate* appears to have been

first applied to ships of war by the English, about the middle of the sixteenth century; almost all merchant ships were at the time so termed. Sixth rates are *sloops of war* and *gun brigs*. After these come *corvettes*, *brigantines*, *schooners*, *cutters*, *gun* and *mortar boats*, etc., which are not rated.

The "Great Harry" was the first ship which had port-holes for the cannon to fire through; previously, the rude pieces of ordnance were mounted so as to fire over the sides, or bulwarks of the vessel.

Bomb and *fire ships* were first used in 1680; the former is a broad, strong vessel, carrying six or eight small guns, and two heavy mortars, for firing what are called shells into a town or fortification, with the view of setting it on fire, and causing as much destruction of life and property as possible. A Frenchman, named Raneau, invented this war missile, which was first used with terrible effect in the bombardment of Algiers, in 1681.

Fire-ships are small vessels filled with combustible and explosive matter, and sent into the midst of an enemy's fleet; as the fuse of a shell is calculated to burn only so long as will enable the missile to reach the spot desired

so is the train lighted in the fire-ship, *before* starting it on its errand of destruction, *intended* to cause an explosion just when it comes *in* contact with the hostile ships, one or more *of* which is generally enveloped in the flames which burst forth from the unwelcome visitor. Alas! that man should so tax his ingenuity to devise means of destroying and injuring his fellow-creatures! Yet such is war. Gun and mortar boats have been found most effective in attacking fortified places so situated as to prevent the near approach of ships of deep draught. We may gain some idea of their dreadful powers of destruction, from the fact that, in the recent bombardment of Sweaborg, in the Baltic, from a distance of two miles, a flotilla of these boats threw into the place about 23,000 shot and shells in thirty-six hours, and destroyed property to the estimated value of several millions, causing the explosion of powder magazines, and scarcely leaving an entire house standing in an area of many miles.

We have now brought our readers up to the present time—a period, unhappily, of immense *activity in the building and equipping of ships of war; and we will endeavour to give them*
an idea of the magnitude of one of those

large floating castles which are now making their thunders echo along the shores of the Baltic and the Black Sea. Let us take as our example the Royal Albert, which, in 1854, was launched from the same dockyard at Woolwich that, more than 200 years ago, sent forth the "Sovereign of the Seas." In that comparatively short interval of time what successful improvements have been made in every branch of art and science, and in none more than those which relate to ship-building and navigation. But the greatest changes of all have been effected by the application of steam power. Steam saws the timber, and welds the iron, and rolls out the copper sheathing, and cuts the bolts; and, in short, does all the heavy work involved in the construction of every ship, which, when completed, is propelled by the same astonishing power to any desired point, although wind and tide may be both adverse.

And what is STEAM? It is water converted into vapour by the action of heat. But how does this act so as to urge, or propel, as it is called, vessels through the waves, turn wheels, and perform so many useful offices? This will perhaps be rather difficult to explain, but let us try. Have you ever looked down?

the engine-room of a steam-packet? if so, you will have seen the great fires by which the water in the boilers is heated, or raised to a high temperature, and you will have seen the bright steel rods, attached to massive beams, working up and down with beautiful order and regularity; these are called the piston-rods, and they work in cylinders; being driven up by the expansive power of the steam, which issues from the boilers, to which the cylinders are attached, and falling again, when, having reached a certain height, the steam is condensed—that is, turned again into water, by letting in cold air upon it, and thus causing what is called a vacuum in the cylinder, for the water occupies much less space than the steam or vapour. And so the action goes on, the pistons alternately rising and falling, and putting in motion certain machinery, which turns the paddle-wheels, consisting of flat pieces of wood or iron, fixed on a circular frame; these paddles striking the surface of the water as the wheel revolves, drive the ship on, in the same way as oars do, only as they act with greater force and certainty, they produce a *more direct and rapid motion*. And then *there is this advantage*—the steam-engine by *which they are worked*, unlike human arms,

never gets tired, and only requires a proper supply of fire and water, and oil to make it go smoothly, to keep on as long as may be desired. Most of the large men-of-war now built are fitted with steam apparatus, but not with paddle-wheels; they have what is called a screw propeller, fitted into a hollow of the stern, where it is not likely to be injured by shot; this may be compared to an immense circular fan of iron, twisted so that the folds, instead of being even, are one above the other; it works on an axis like a wheel, and may have a propelling power equal to the strength of five hundred horses, or more; for a first-rate ship a power of propulsion equal to that of a thousand horses is required. Such a ship is the ROYAL ALBERT—a perfect masterpiece of human skill and ingenuity, and a striking proof of the great advances made in naval architecture within the last century. Without seeing and examining such a structure as this, it is scarcely possible to form an idea of its immensity of size and grandeur of proportions; yet it may assist the mind somewhat to understand what is meant, when we speak of a first-rate man-of-war of the present day, if we set before it a few of the facts and figures connected with the ship above named. First

then, her extreme length is 272 feet, breadth 61 feet, and depth 66 feet; the mere weight of timber and iron in her hull alone is 3200 tons; when fully rigged and equipped, her estimated weight is not less than 5500 tons. She carries 130 guns, all of large size, besides a huge one on the forecastle, mounted on a pivot to fire in any direction, which weighs five tons, and will throw a solid iron shot, of 68 pounds weight, a distance of three miles; the whole weight of her broadside of metal—that is, supposing all the guns on one side of her to be fired at once—would be close upon 4000 pounds, and this tremendous storm of iron can all be directed upon one point: fancy what must be the dreadful effect of but a single discharge. Such a ship as this is like a floating town, somewhere about 1000 men being her regular complement, or number. Her *burden* is about 2750 tons, this meaning the quantity that a ship will carry, which is called her *tonnage*.

It may well be supposed that the building and equipping of such a ship as this would cost an immense sum of money—how much do *my readers* imagine? One thousand pounds is *a large sum*; ten hundred golden sovereigns—*quite a fortune*! Count them,—one, two, three,

four, five, six, seven, eight, nine, ten, one hundred times told ; that makes a thousand : and about *one hundred and thirty times* this sum is what a hundred and thirty gun ship would cost : a thousand pounds per gun being the rough, but sufficiently near calculation. And the British nation have afloat at the present time about five hundred and forty ships of war, mounting from ten to one hundred and twenty guns each—an amount of property almost beyond calculation, and a power of destruction fearful to contemplate. Then on board of this immense fleet are some sixty thousand persons, officers and men, comprising what is called the British navy ; all, from the admiral, the highest rank in the service, to the cabin-boy, which is the lowest, having certain duties to perform, and being under the control of a superior body, which forms part of the government of the country, and is called the Admiralty Board.

We will now briefly allude to the different parts of a ship, that is, the principal parts, for to describe all the particulars of such a mighty and complicated structure would require a volume to itself. Let us begin, then, with the *hull*—that is, the body—which is built in what is called a *ship*, so constructed as to slope gently

down to the water, into which the ship, when finished, is to be launched. You will perhaps smile when I speak of such things as *stocks*, and a *cradle* for such a giant, yet these are the terms applied to the cross timbers on which the keel is laid down, and to the stout framework on which the whole fabric rests previous to launching. Were it not for these side supports, it would assuredly topple over, and be crushed by its own weight; they are so constructed as to move with the ship, and to fall away when it floats on the water, and no longer needs them; like true friends, rendering assistance all the while it is required.

The *shores*, which are strong timbers placed in a slanting direction, with one end planted firmly in the ground, and the other resting against the hull, also assist in supporting it until ready for launching, when they are knocked away. The *stocks* are also sometimes called *ways*, and these are well greased to prevent friction, and facilitate the sliding of the great sea monster. After a launch, it is good sport to see men and boys, in small boats, in *chase of the lumps of tallow* which go bobbing *about here and there*, and slipping away from *the outstretched arms and buckets*, as if they

did not like to be caught. But let us go back to the solid oaken *keel*, which is now laid down, as it is called, on cross pieces between the *stocks*. A hundred brawny arms are swinging large iron hammers, and soon the square ribs begin to branch out on either side: *clink! clink! clink!* in are driven the iron bolts; the shipwrights are busy as a swarm of bees. The ribs, after describing about a quarter of a circle, are joined to other timbers, these joints being called *futtocks*, and carried nearly straight up, taking rather an inward direction, so that the greatest bulk of the hull is where the ship sits upon the water. These ribs meet inside of the hull, and upon them is laid another long square piece of timber, called the inner keel or *kelson*, and upon this are the steps or hollows prepared to receive the bottoms of the masts; the two keels, and the timbers between, called the floor timbers, are all fastened together by means of iron, or copper bolts; the latter metal is most commonly used in ships of war, as, although more expensive, it is more tough and durable. The outer planking of the hull is also bolted to the ribs in the same way, and the part of the ship which, when she is afloat, is always submerged—that is, under water—is

covered with sheets of copper, to protect the wood from the ravages of a kind of marine worm, which would soon drill holes in the stout planks, and cause the destruction of the stately vessel, and perhaps of all on board. See, now, what mischief may be done by little things. Much art is required in joining together the ribs of a ship, and so placing the timbers and fitting them into each other, that they will bear the tremendous strain which comes upon them in stormy weather; when on board the best planned and most strongly built vessels, such creakings and groanings are heard, that persons unused to the sounds would imagine that the whole fabric was coming to pieces. The beams which support the deck planks are fixed firmly to the side timbers, or ribs, by what are called *knees* of iron, and pillars of the same metal, called *stanchions*, pass up through the middle of the hull, and form a centre support for the decks, which in a first-rate are five in number; that is, beginning from the top—the *quarter-deck*, the *main-deck*, the *middle-deck*, the *lower-deck*, the *orlop-deck*, and *cockpit*; below these are the *hold*, and the *main*, *middle*, and *channel wales*, the *wales* being extra thick planks, which are carried through the whole length of the ship, to

strengthen it. We have now given an outline of the hull of a man-of-war ; the filling in, such as *ward-rooms*, *gun-rooms*, *state-rooms*, *cabins*, and the like, we must leave, and say a few words about the masts, rigging, etc. Of the former there are three, the *fore*, *main*, and *mizen masts* ; the first of which is situated very near the bow, or foremost end of the ship ; the second is about in the middle ; and the third about midway between that and the stern, or after part, as it is called. Sailors speak of the two ends as *fore* and *aft*, and sometimes tell you that something was done, or happened, *abaft* a certain point or position—as *abaft the binnacle* ; that is, behind the compass-box, which is situated a little in advance of the wheel by which the *helm*, or *rudder*, that steers the ship is turned.

They are queer fellows, these sailors, and have a language peculiar to themselves. For instance, they talk of *windard* and *leeward*, that means windward and leeward ; they do not pull a rope tight and fasten it, but they *haul taut and belay* ; they do not turn the rudder to the right or left, but they *starboard the helm*, and they *port the helm* ; if a mast is carried clean away, it is

gone by the board; twelve o'clock with them is *eight bells*; they do not go to bed, they *turn in*; and if the boatswain, or I should say *boson*, wants them to turn out, he gives a shrill whistle, shouts *all hands a-hoy*! and politely invites them to *tumble up*. Their sails are *sheets*, a great deal too big for their beds, which they call *hammocks*; their masts, although they call them *sticks*, would be very awkward things to walk with; and what they term a *capful of wind*, a landsman would think a stiffish gale. They do not pull up the anchor, they *heave* it up; and if it will not come readily, they say it is not hooked or caught, but *fouled* with something; they *let go the painter*, when they loosen a small rope that holds a boat; they *bind* and *unbind* the sails, and hang their anchors up to projecting pieces of timber, which they call *cat-heads*; if horizontally, or lengthways, they are *catted and fished*; if perpendicularly, or straight up and down, they hang *a-cock-bill*, and so on. Oh, they are wonderful fellows! But we shall have more to say about them presently. Let us now keep on with the ship, each of whose three masts is *divided into three portions*, the lower being *called the fore, main, or mizen mast*, as the case *may be*, with the addition of top, and top-

gallant, or, as the sailors would say, *to-gallun-mast*; above the highest of these, if they want to set *every stitch of canvas*, they send *royals* and *sky-scrapers*, and then what a vast expanse of canvas is spread to catch the favouring gale. But woe to the ship that is caught in a sudden squall, or violent gust of wind, such as sometimes comes down upon the Mediterranean, without any warning, while bounding along under such a spread of sail; in five minutes she may perhaps be a complete wreck, with all her beautiful *gear*, as the rigging is called, hanging loosely about her; her sails torn into ribands, and her masts, if not carried away, deprived of the support afforded each to each by the crossing and recrossing ropes, now snapping like packthread, tottering to their fall, while the yards are swaying about, and adding to the danger, by their unmanageable weight. What an awful thing is the wreck of a large ship, with nothing but a few parting timbers between so many hundred souls and eternity.

The immense anchors which the ship carries are useless then; these are six in number, the *best bower* and *sheet anchors* being on the *star-board*, or right side of the bow; the small *bower* and *stream anchors* on the *larboard*, or left side.

while the *kedg*e and *spare anchors* are stowed away below. When far out at sea, where anchors could not be used, on account of the great depth, those which we usually see hanging by the bow are placed out of the way, abaft the fore rigging. You know what an anchor is, having, no doubt, often seen one, or, at all events, a picture of one; let me tell you what the different parts of it are called. First, there is the *shank*, the straight, strong, middle piece of iron; to this, near the top, is fastened the stock, which is of timber, several pieces bound together by iron hoops; this, by its buoyancy, or disposition to float, ensures that the anchor, when let down, or *dropped*, as the sailors say, shall descend so that the *flukes*, which are at the other end of the shank, shall reach the bottom first, and fall in such a manner, that one of them at once penetrates the sand, and becomes the more firmly imbedded, the more the cable to which the anchor is attached is drawn in this or that direction. These flukes, as you know, are formed like the heads of immense arrows; they are two in number, one on each side, and project *inwards* in a direction opposite to the stock, and *you may easily* understand how any effort made *to drag them* along the bottom surface would

but drive them further in. On the top of the shank is a hole, through which passes an iron ring, to this the cable is attached ; this may be either a *chain cable*, formed of iron links of great thickness, or one of rope ; the former are now most commonly used, as they occupy much less room in the stowage, and are equally strong. A rope cable is sometimes as much as twenty-five inches in circumference, that is, round the outside ; it is one hundred fathoms long, weighs nearly six tons, and is worth about £400. One of the largest anchors will weigh four and a half, or five tons, and be worth £360, or more ; so that losing an anchor and cable is a serious matter. The holes in the ship's bow, through which the cable passes, are called *hawse-holes*. The sailors call letting down an anchor, *dropping* it, and they use what is termed a *capstan* to draw it up, or as they say, *heave* it again. The capstan of a ship is formed like those frequently seen along shore, used for drawing up the boats above high-water mark ; it has a moveable top, called the *drum-head*, with holes around the sides, into which long poles, called *capstan bars*, are inserted ; at each of these several men place themselves, and pushing with all their strength in one direction, the machine moves round, and winds

in the cable: *stamp! stamp!* they go, with a *ho heave oh!* keeping time with their feet and voices, generally to the accompaniment of a drum and fife, or a fiddle, if it be a merchant ship; and the capstan creaks and groans, and the cable comes slowly in, like a huge sea serpent, to be stowed away, coil upon coil, in its proper place below, on the orlop deck. And the good ship, with her anchor *weighed*, as it is termed, leaves her *moorings*, and with sails spread or funnels smoking, ploughs the deep, or, as a poet has said—

“Walks the waters like a thing of life,
And seems to dare the elements to strife.”

But these elements, the winds and the seas, are sometimes too powerful for even the mighty ship of war; her massive timbers, bolted and riveted together with iron and copper, are riven apart, and scattered far and wide over the ocean, on which she had been tossed about like a feather; then, when there is no hope of saving the ship from destruction, the cry is raised—to *the boats!* of these a first-rate has on board as many as eight or ten; the *launch*, which is *the largest*, being sometimes thirty feet and *more in length*, by ten feet on the beam—that is, *across*; the names of the others are the

long boat, the *jolly boat*, the *barge*, the *yawl*, the *cutter*, the *pinnace*, the *galley*, the captain's *gig*. The largest of these boats are stowed away in what is termed the *waist* of the ship, where the *booms*, or spare spars, are kept, to be used in case of accident; the smaller boats are suspended to *davits*, which are bent pieces of iron, made to fit into sockets, or *eyes*, attached to the ship's side; these are generally termed quarter boats, because they are slung at those parts of the ships called the quarters. The ropes by which the boats are hung are termed *tackles*, and attached to these, running through *blocks*, are the *tackle falls*, by which they are lowered into the water.

And now we have said pretty nearly all that our space will allow us to say about the different parts of a ship, and perhaps more than our readers will be able to remember. Those immense sheets of canvas called the sails, the yards which support them, and the *gear*, by which they are *hoisted* and *lowered*, *furled* and *reefed*, and so forth, have all their particular names, and very funny ones some of them are. Every line in the rigging, every division of the *masts* and spars, every piece of metal or timber, *shaped* and contrived to serve a special purpose

has its peculiar designation: there are *shrouds* and *ratlines*, and *halyards* and *lanyards*; *cross-trees*, and *tops*, and *trucks*; *ear* and *clue-garnets*, and *gangways*, and *dead-eyes*, and *crowfoots*, and *saddles*, and we know not what,—such a host of names, that the wonder is, they can all be remembered by that careless-looking fellow the Jack-tar, who would very likely call you a *lubber* or a *swab*, if you displayed ignorance in these matters, which are to him so very plain and simple. Such a phrase, for instance, as *all a taunto* applied to a ship with her loftiest spars run up, and all her sails set,—what can be plainer? thinks Jack; but to the landsman it is like so much Greek or Latin.

Boats, as well as ships, are guided by a helm, or, as it is often called in sea language, a *helem*, and the steering in some situations, where the channel is narrow and the bottom rocky, is a delicate operation, confided only to experienced persons. For coast navigation there are those called *pilots*, who are acquainted with the exact position of all the rocks and sand-banks, the force of the currents, and all that might endanger the safety of a vessel, which is taken charge of by one of the pilots as soon as it approaches the land. Out on the broad oce

where there are no landmarks to indicate the right course, the *mariner's compass* is a sure guide. The position of the stars is also observed by those who have the direction of the ship, and whose knowledge of the art of navigation, and the use of nautical instruments, enables them to be as sure of their course as we should be on the beaten road, with milestones and direction-posts for our guidance. You have perhaps seen a MARINER'S COMPASS, have looked into the little circular brass box, to observe the lines diverging from a central point, like the rays of a star; at the ends of the four thickest are the letters N. S. E. W., denoting the cardinal, that is chief, points of the compass; between these are thinner lines, with other letters, such as NNE., SSW., meaning north-north-east, or south-south-west, according as they are nearer to, or more distant from, such a chief point. Above these marks, attached loosely to a central pivot, is a little steel thing shaped like a dart, or the hand of a clock, and to this is fixed the *magnetic needle*, which always, except under some peculiar circumstances, points northward; the little box which contains it may be shaken about, and turned in any direction, but the needle, after oscillating—that is, swinging

to and fro for a while—will settle itself and remain steady, and the mariner *knows* that it points to a certain quarter of the heavens, and thus accordingly, by the lines on his compass dial, he can also tell the direction of the wind, and how useful an instrument this must be to him will at once be apparent.

Without the mariner's compass, it would be impossible to traverse wide tracts of the ocean, and to explore unknown seas. It appears to have been used by the Chinese thousands of years ago, and was probably known to other nations of antiquity in the East, although it did not come into use in Europe, until late in the twelfth, or early in the thirteenth century. The Italians contend that a countryman of theirs, one Flavio Gioja, of Amalfi, near Naples, was the inventor of the compass as a nautical instrument, but it had been described more than a century before his time, by a French minstrel, named Guyot, who had probably attached himself to one of the early crusades and seen it employed by the Saracens. It seems likely that we may give to Gioja the credit of *having improved* the instrument, and *introduced it to extensive use among the mariners of this quarter of the globe*, and if

did this only, he may be regarded as one of the benefactors of mankind.

A few words must now be said about the different kinds of ships and boats. We have already spoken of those of ancient times, and briefly alluded to such as are in use among barbarous tribes, who are unacquainted with the arts of civilization. We have given, too, the dimensions of a first-rate ship of war of our own time and country. Since the launching of this leviathan of the deep, another, still larger, called the "Marlborough" has been set afloat, and others of yet greater extent are, we understand, in progress; so there is no knowing what size our floating castles may eventually attain. That must have been a large ship which was taken from the Saracens, by Richard the First, on his way to the Holy Land, for we read that it was defended by 1300 men; but our largest ships, if crowded, as that probably was, would hold 2000 and more; indeed, there are now afloat several steam-ships, built for the conveyance of passengers and merchandise, capable of accommodating far more than this number. You will remember, then, that a *line-of-battle ship*, or *liner*, as it is frequently called, is a *war-ship* of the largest class, carrying seventy

guns and upwards. A *frigate* is of lighter build, more adapted for quick movements; it may have from thirty to sixty guns. A *sloop of war* is also a three-masted ship; a *gun brig* has but two masts: they are both usually heavily armed. After these come the *corvette*, which is a small kind of sloop; the *brigantine*, a light, swift-sailing vessel; the *schooner* and the *cutter*, the former having two masts, and the latter one only; these are slight, sharp-built vessels, generally acting as *tenders* to the larger ships; that is, they wait upon them, carry their messages, supply them with provisions and other necessities from the shore. Their rig is different from the rest; they do not have square, but what are called *fore-and-aft sails*, supported by a *gaff* at the top, projecting sternwards only, and kept out by a *boom* at the bottom; the masts of the schooners generally *rake* considerably—that is, incline backward; hence they are called *rakish-looking craft*. Vessels of this build and rig are much employed in the abominable slave traffic, and for purposes of piracy, because they can spread a vast quantity of canvas, and sail with *amazing swiftness*. A Dutch *galliotte* has this rig, but is much heavier in build; the Levantine or Greek *polacca* has also this shape, but she

carries three masts, without any topmasts, and what are called *lateen*, or, from their peculiar shape, shoulder-of-mutton sails; such sails also do the Indian *proas* hoist, when they run before the wind, and a defenceless merchantman might as well fall in the way of one as the other: like the swift-sailing vessels of the Moors of Africa, once a terror to the seas, their room is at all times more pleasant than their company. The light *cutter* of the Royal Navy is the vessel generally employed in what is termed the Preventive service; that is, to prevent the introduction of articles from abroad, on which the lawful duty has not been paid. Many a chace has the *revenue cutter* had after one of those large, strong, three-masted boats which one often sees drawn up on the beach, and which are called *luggers*, laden with a cargo of tea, tobacco, silk, or brandy, which it was the object of her crew to land, or *run*, as it was termed, on a part of the coast where men were in readiness to carry it up the country for private sale. But, thanks to the great reduction of import duties which has taken place of late years, smuggling is not carried on extensively in England now, and much bloodshed and crime is avoided. See, we have got from the huge

man-of-war down to the lugger, in which the *pilot* goes forth to meet the homeward bound ship, and bring her safely into port ; in which the *hoveller*, as he is termed, launches through the heavy surf, to carry an anchor or cable, or render what help he can, to the foundering bark ; in which the *fisherman* passes long days and nights far out at sea, and returns laden with finny spoil. Many other kinds of vessels may be seen lying dry about the shore, or afloat upon the briny deep ; here, upon the shingles blackened with sea weed, is the long eight, ten, or twelve oared *galley*, and the little round *punt*, with other boats of various sorts and sizes ; out there, with her sails glancing in the sunshine, like the wings of a sea bird, goes the trim, pleasure *yacht*, with a wreath of spray about her bow ; the three-masted *bark*, from East or West, deeply laden with the produce of other climes ; the heavy *coal brig* from Newcastle or Sunderland ; the *timber ship* from Quebec or Norway ; the *sailing* or *steam packet*, with her mail bags and passengers ; the lumbering *Dutch boat*, with her cargo of cheese and butter ; the *French trader*, with hundreds of thousands of eggs, or it may be some lighter ware ; the fruit *schooner* from sunny Spain or Portugal, or the

Levant; the *emigrant ship*, or the *steam ship*, warlike or commercial, all ploughing the deep on their several errands of business or enjoyment, and giving life, interest, and variety to the scene.

And now let us say a few words about COMMERCE, the blessings and advantages of which our facilities of intercourse with other nations by water enable us fully to enjoy. The term comes from the Latin *commercium*, and it means the exchange of one sort of produce or service for another sort. It is by commerce that this nation has become so great and prosperous. We are a commercial people, more so, perhaps, than any people on the surface of the globe. English merchants are to be found everywhere, and the English merchant ship ploughs her way along every sea coast, and up and down almost every navigable river. Our vast possessions abroad afford immense facilities for commerce, and they are beneficial to the mother country, just in proportion to the advantages of this kind which they offer. We cannot better illustrate this subject than by quoting the following excellent remarks from the *Saturday Magazine*, a periodical from which many of our readers must have often gathered much sound instruc-

tion. "All countries will not produce the same things; but, by means of exchanges, each country may enjoy all the produce of the others. Cotton would not grow here, except in a hothouse. It grows in the fields in America; but the Americans cannot spin and weave it so cheaply as we can; because we have more skill and better machines. It answers best, therefore, for them to send us the cotton-wool, and they take in exchange part of the cotton made into cloth; and thus both we and they are best supplied.

"Tea, again, comes from China, and sugar from the West Indies; neither of them could be raised here without a hothouse. No more can oranges, which come from Portugal, and other southern countries. But we get all these in exchange for knives, and scissors, and cloth, which we can make much better and cheaper than the Chinese, and West Indians, and Portuguese; and so both parties are better off than if they made everything at home.

"How useful water is for commerce! The sea *seems* to keep different countries separate; but, *for the purpose* of commerce, it rather brings *them together*. If there were only land *between this and America*, we should have no *cotton*; the carriage of it would cost more than

it is worth. Think how many horses would be wanted to draw such a load as comes in one ship; and they must eat, and rest, while they were travelling. But the winds are the horses which carry the ship along; and they cost us nothing but to spread a sail.

“Then, too, the ship moves easily, because it floats on the water, instead of dragging on the ground like a waggon. For this reason, we have made canals in many places, for the sake of bringing goods by water. One or two horses can easily draw a barge along a canal with a load, which twice as many could not move if it were on the ground.

“What a folly it is, as well as a sin, for different nations to be jealous of each other, and to go to war, instead of trading together peaceably; by which both would be the richer and the better off. But the best gifts of God are given in vain to those who are perverse.”

QUESTIONS.

- | | |
|--|---|
| What is the term <i>ship</i> derived from? | By which of the prophets are the ships of Tarshish and Chittim referred to? |
| How does Johnson define a ship? | What kind of vessels were those mentioned in the New Testament? |
| Is this definition correct? | What is the term <i>navigation</i> derived from? |
| What is more so? | What is the root of the word <i>nautical</i> ? |
| What is the term <i>naval architecture</i> derived from? | Mention two other terms derived from the same root. |
| What is the first large vessel spoken of in Scripture? | What ships does Homer describe? |
| Where is the first mention made of war ships? | |
| Where of merchant ships? | |
| To what does Solomon liken a ship? | |

- What were the *galleys* of the ancients?
- What did they have at the prow?
- How can we account for many of the fables in the Mythology?
- What ship does Shakspeare describe?
- What is observed about the boats of uncivilized tribes?
- What are *paddles*?
- What is the simplest form of a floating vessel?
- Who used the *raft*?
- Describe a raft.
- What occasionally happened with the Peruvian rafts?
- Where do the large timber rafts come from?
- Describe one of them.
- Say how the South-sea islanders leave and return to their shores.
- What is the name of the raft used on the Indian coasts?
- What else do you recollect about the raft?
- By whom is the *canoe* used?
- Describe a canoe.
- Of what shape are the paddles?
- What did the Macedonians say of the people whom they saw using them?
- What kind of vessel did Herodotus describe?
- Where did Major Rennell see such a vessel in use?
- What was it called?
- What was the boat of the ancient Britons called?
- What kind of a boat does the American Indian use?
- What the Greenlander?
- What the Society islander?
- What the Ladrone islander?
- How are the Scandinavian boats described by Tacitus?
- What are these boats called in the present day?
- What is said of the Greeks and Moors?
- What is likely to have suggested the idea of *sails*?
- Of what material were they first made?
- What did Julius Cæsar observe of them?
- What is likely to have originated the story of *Heracles* and the lion?
- What kind of sails did some early navigators use?
- What do the native West Indians now employ?
- What are the materials now used by civilized people for rope and sails?
- What is the botanical name of the *hemp plant*?
- Can you describe it?
- What is the botanical name of *flax*?
- What is it said to be derived from?
- Mention another common English word from the same root.
- What difference is there between the hemp and flax fibres?
- Describe the flax plant.
- What oil do we get from the seeds of the flax?
- From what country have we obtained our largest supplies of hemp and flax?
- What quantity has been imported in a year?
- What other countries furnish a portion?
- Where has flax cultivation been lately introduced?
- What are the fibres of the two plants called?
- How are they separated from the woody parts?
- What had the Britons to oppose the Roman galleys and ships of the Danes and Saxons?
- At what period does the history of the British navy commence?
- When did Britain take a permanent place as a maritime power?
- Were the vessels built and equipped by King Alfred of large size?
- Describe a war ship of the time of Richard II.
- Who led out the first fleet that ever left these shores?
- What was its destination?
- Who won the first naval battle between England and France?
- How many ships had he?
- Were all these built for warlike purposes?
- On what expedition did Henry III go?
- In what year?

- How many ships had he ?
 For what purpose did Edward III.
 employ a large number of ships ?
 How was the fleet made up ?
 When was the first English admiral
 appointed ?
 What was his name ?
 When was the bowsprit first used ?
 What was there at the bows of an-
 cient ships of war ?
 What were the *checks* and the
goose of an ancient ship ?
 What do we now call the part which
 divides the waves ?
 Where was the first large ship of
 the British navy built ?
 When, how, and where was it
 destroyed ?
 What was the name of the next
 large ship ?
 When was it built, and where ?
 How many guns did it carry ?
 When was the name changed, and
 to what ?
 What was the name given to the
 next large ship ?
 When and where was she built ?
 How many guns did she carry,
 and what was her estimated
 burden ?
 Who has been termed the founder
 of the Royal Navy of Britain ?
 What did he do to earn this title ?
 What is the mercantile marine ?
 What the Trinity House ?
 What occurred in the reign of
 Elizabeth ?
 Under what date do we first read
 of a classification of war ships ?
 What were the four classes called ?
 How were they classed in the reign
 of Charles I. ?
 How many ships of war had the
 nation at the death of George I. ?
 What are the first, second, and
 third rates called ?
 What the fourth and fifth ?
 What the rest ?
 Which was the first ship that had
 portholes ?
 When were bombs and fireships
 first used ?
 Who invented shells ?
 When were they first used ?
 What are fireships ?
 When was the Royal Albert
 launched, and where ?
- What has effected great changes
 in ship-building and navigation ?
 What is *steam* ?
 How does it act on propelling
 ships ?
 What form of propelling is now
 used in ships of war ?
 Into what part of the ship is it
 fitted ?
 What is the length, breadth, and
 depth of the Royal Albert ?
 What weight of timber and iron is
 there in her hull ?
 What is her whole estimated
 weight ?
 How many guns does she carry ?
 and what weight of metal is
 there in a single broadside ?
 What is her complement of men,
 and what her tonnage ?
 What do you understand by the
 last term ?
 What is about the cost of such a
 ship ?
 How many ships of war have we
 afloat at present ?
 How many guns do they mount ?
 How many men do they carry ?
 What is that body called which re-
 gulates the affairs of the navy ?
 What is the body of a ship
 called ?
 What is it built on ?
 What is it supported by ?
 What are the *shores* ?
 What is the first part laid down ?
 What are the joints of the ribs
 called ?
 What is the inner keel termed ?
 With what metal is the bottom
 covered ?
 Why is it necessary so to protect it ?
 What are *knees* and *stanchions* ?
 Name the different decks.
 What are the *wales* ?
 How many masts are there, and
 what are they called ?
 What do you understand by *fore*
 and *aft* ?
 Where is the binnacle situated ?
 What is that called by which the
 ship is steered ?
 How are the masts divided ?
 What is higher than the top-gal-
 lant mast ?
 What is a sudden gust of wind
 called ?

- Where are such prevalent?
 What is often the effect?
 How many anchors does a large ship carry?
 What are they called?
 What are the different parts of an anchor?
 How are the flukes formed?
 How do they act?
 What are cables made of?
 Why are chain cables preferable?
 What is the length and weight of a large rope cable?
 What is it worth?
 What do the largest anchors weigh?
 What is the cost of one?
 What are *hawse-holes*?
 What is a *captain*?
 How is it worked?
 How many boats has a first-rate ship?
 What are their names?
 What are *davits*?
 What are *pilots*?
 How do navigators know the right course?
 Describe the mariner's compass.
 What is the needle called?
 In what direction does it point?
 Was the use of this instrument known long since?
 How long, and by whom?
 When did it come into use in Europe?
 Who do the Italians say invented it?
 By what old French author was it described?
 What ship larger than the Prince Albert has been recently launched?
 How long is the Himalaya?
 How many horse power?
 What is a *liner*?
 What is a *frigate*?
 What is a *sloop of war*?
 What is a *gun-brig*?
 What is a *corvette*?
 What is a *brigantine*?
 What are *schooners* and *cutters*?
 In what respect do they differ from other vessels?
- What do you understand by *ra-kish*?
 How are such vessels much employed, and for what reason?
 How is the *polacca* rigged?
 What are her sails called?
 What other vessels have such sails?
 What is the *preventive service*, and what kind of vessel is generally employed on it?
 What is a *lugger*?
 For what work is it commonly employed?
 Is there much smuggling in this country now?
 Why not?
 Name three classes of men who commonly make use of the lugger.
 What other boats does one often see on the beach?
 What is the name of the vessel used for purposes of pleasure?
 What is the large three-masted merchantman called?
 From whence does the coal-brig generally come?
 From whence the timber-ship?
 What does the sailing or steam-packet carry?
 What is often the cargo of the Dutch boats?
 What of the French trader?
 From whence does the French schooner come?
 What is the derivation of the word *commerce*?
 What is *commerce*?
 To what is our national greatness and prosperity owing?
 Why are our islands so valuable to us?
 Why cannot we grow cotton and sugar, and other tropical produce in this country?
 Is it no disadvantage that we cannot?
 Does the sea really separate this and other countries?
 What if there were no seas?
 What moral lesson do you derive from all this?



SECTION III. *Sailors and Fishermen.*

SAILORS are sometimes called *mariners*; the term is derived from the Latin *mare*, the sea. Hence, too, we have the name *marines*, given to a body of men who are trained to fight on board ship, as well as on land; their motto is *per mare et terram*—by land and by sea. Every war-ship has a number of these men on board, whose duty it is, during an action, to fire from the tops and other parts of the ship on the enemy, and defend the deck, if necessary, against an attack by boarding; they are also sent on shore to assault towns or forts, or to act in conjunction with land forces. The *marines* are clothed and armed in the same manner as foot soldiers, and their red coats are

regular movements offer a strong contrast to the blue jackets and rolling gait of the sailors, although these, when drawn up on the deck of a man-of-war, with their clean white duck trousers, round straw hats, and lay-down collars, present a very trim and neat appearance, but they never can be brought to hold their heads up stiffly like the marines, whom they call "lobsters," on account of the colour of their coats. "Who was the first sailor, tell me who can?" asks Mary Howitt; "was it old Father Neptune?" Neptune, you know, was the god of the sea, according to the ancient fable. "Was it old Father Noah?" We doubt if Noah could be called much of a sailor; directed by God, he built a huge vessel, called the *ark*, into which he and his family entered, but we do not learn that he guided or navigated it. The Almighty caused it to float safely amid the rushing and whirling waters of the flood, and to find a secure resting-place upon Mount Ararat, when the deluge subsided. "Was it old Father Jason?" and who was Jason? According to the Mythology, he was the leader of a band of Greeks called *Argonauts*, who went forth upon the sea in a ship named *Argo*, in search of a wonderful golden fleece, and these,

it is said, were the first navigators of the ocean. But "no, you are wrong," says Mrs. Howitt; for the first sailor

"Was naught but the poor little Nautilus,
Sailing away in his pearly shell;
He has no aid of a compass like us—
Foul or fair weather he manages well."

Yes; for if the weather is foul, he sinks to the bottom, where all is calm and still; if fair, he comes to the surface, and skims along right merrily. We cannot, however, allow that this little shell-fish, the Paper Nautilus, whose scientific name is *Argonauta Argo*, was really the first sailor; for a sailor, Johnson says, "is one who understands navigation," and the nautilus, after all, is but a swimmer, which cannot be said to understand anything, as it has no reason. How, then, shall we answer the question? Perhaps, it will be better not to attempt an answer. Guided by the records of history, we may say who were early navigators, but we cannot tell who was the first of them.

The earliest maritime expedition of which we have any clearly defined notice by ancient authors, is that of the above-mentioned Jason, who seems to have been really an historical person, although the account given of his ad

ventures is in a great measure fabulous. He is said to have been a Phœnician pilot, and not a Greek, as the Mythology would have us believe. Now Phœnicia was the name of that part of Asia on whose shores, washed by the Mediterranean, the celebrated cities of Tyre and Sidon were situated. The Phœnicians were great merchants, and even in the time of King David, or earlier, had settlements, or colonies, in the Persian Gulf, and elsewhere; they are said to have circumnavigated, that is sailed round, the whole of Africa. There seems little doubt that it was by them that the ships of Solomon, before spoken of, were directed on their long voyages, if not entirely manned. The Greek poet Homer, in his "Odyssey," speaks of these mariners, and describes their mode of doing business in a foreign port. The Phœnicians, then, were certainly among the earliest navigators; to Spain, where they had a settlement, and even as far north as Britain, did they send their ships. Here they came for tin and other natural products, and little thought that the rude and barbarous people, who looked down *from their white cliffs in astonishment at such marvels of naval architecture as their ships appeared, in comparison with their own wicker*

coracles, would one day as far surpass them in commercial enterprise, and all that conduces to pre-eminence on the seas, as they themselves then surpassed any other nation. But so it was; in miserable huts, amid swamps and tangled forests, with painted naked bodies, and minds as ignorant and benighted as the veriest savages, dwelt the men whose descendants were to be heroes of commerce, the mightiest, the most daring, and the most successful of all that ever went forth from crowded ports and harbours, filled with the riches of the world, in their "wave-ruling chariots of fire," as war-ships have been poetically called.

The Chinese were, no doubt, very early navigators, although perhaps their voyages did not extend far from their own coasts, or some of the nearest islands in the Indian seas. So were the Egyptians, whose kings Rameses, Memnon, Sesostris, and Pharoah Necho, are mentioned as conquerors on the ocean.

One thousand years before the birth of our Saviour, King Solomon sent fleets down the Red Sea, and south-west along the African coast; but these, as we have before said, were, *it is likely*, manned by Phœnicians. Darius, *the Persian*, fitted out a naval armament, to co-

operate with his land forces sent against India, and thus opened the way for a communication between that distant quarter of the globe and the coasts of the Mediterranean, on which sea it is likely that the people of Segia, and of Crete, two Greek islands—the first situated in the Egean Sea, and the last in the Levant—were already afloat. The Cretans are said to have been the first people who possessed the empire of the seas—that is, who were masters of it; although the inhabitants of Corinth and Corcyra, also Greek islands, had previously sent out fleets.

It is related that in the year 480 before Christ, one Setaspes, a Persian nobleman, whom Xerxes had condemned to death, had his life spared, on condition that he circumnavigated the coast of Africa. He commenced his voyage in Egypt, sailed through the Straits of Gibraltar, and passed southward to the Atlantic, where the mountainous waves, beating upon the desert shore, so alarmed him, that he turned back to certain death, rather than face the danger. Alexander the Great had fleets, as *well as* armies, to aid him in his designs of *universal conquest*; he was a robber and a *pirate on a large scale*. Such, also, were the

Carthaginian generals, Hanno and Hamilcar, who disputed with the Romans the empire of the sea, as well as of the land. We are told that Eudoxus, a native of Cyzicus, in the Propontis, now called the Sea of Marmora, sailed all round the coast of Africa, from the Red Sea, and entered the Mediterranean by the Columns of Hercules—that is, by the Straits of Gibraltar; and that Pytheus, a native of a Greek colony called Massilia, made two voyages, one round the western coast of Europe, and through the English Channel, as far as Thule, or Iceland. This navigator is thought by some authorities to be the first discoverer of Britain, where, according to his own account, he landed, and travelled inland as far as *the country was accessible*. The circumference of the island he says was about 40,000 *stadia*, what distance this may mean we cannot exactly tell; for although a *stadium* was the eighth part of a Roman mile, yet the Greek travellers were accustomed to a very uncertain mode of measuring distances; thus with them, a journey, or a voyage, occupied so many days, and a day was equal to so many stadia; multiply one by the other, and *it gives the whole distance traversed*. This was *their method of computing*, and Captain Py-

theus, who is said to have been a mathematician and astronomer, as well as a navigator, no doubt thought that he had got the dimensions of our "tight little island" to a nicety; and indeed we cannot say that he had not.

To the voyages of Eudoxus and Pytheus no dates are assigned; and over them, as well as over all of those previously mentioned, history throws a faint and uncertain light.

In the sixth century we commence what may really be called the history of navigation; then it was that the Arabians began to signalize themselves as a maritime people. A century later, the Saracens, or Moors, established a claim to naval superiority. In 670, having already taken Cyprus, Rhodes, and several of the Grecian islands by means of their fleets, they laid siege to Constantinople. In sixty years or so from this time, we find them masters of the Mediterranean, where for a long period they maintained their naval superiority, both as merchants and warriors. One of the countries which this enterprising and warlike people conquered was Spain; and in 970, Abderrahman, the sultan or caliph of this *country*, built a ship larger than had ever been *seen in those parts* before, and freighted it

with the richest merchandise for the East; but having on her way pillaged a vessel bound on a friendly mission from the Emir of Sicily to Almez, an African prince, the latter fitted out a fleet, went in pursuit of the Moorish ship, and took her, with all her rich cargo, as she was returning to Spain.

Navigators, in those early times, had very strange notions of the shape of the earth, the general idea being that it was a flat surface, bounded on every side by the sky; there were, however, then those who considered it to be a globe; for we read that in the sixth century, one Cormas, a Greek merchant, wrote a book, whose main object was to prove that this could not be. Massudi, a Moorish, or Arabian writer of the tenth century, who composed a history of the known world, compared the earth to a bird, of which Mecca and Medina were the head, Africa the tail, Persia and India the right wing, and the land of Gog (wherever that might be) the left. This will show how little could have been known, even by those who knew best, about the extent, form, and positions of the different portions of our planet. When the Greeks, and, after them, the Moors, laid claim to the sovereignty of the seas, they little

thought that there were vast oceans which no keel of theirs had ever ploughed, and wide watery tracts, compared with which in extent the scene of their triumphs was but small indeed. The Venetians, or people of Venice, a small State in the Adriatic Sea, which is a gulf of the Mediterranean, running up between Italy and Greece, are the next who occupy a prominent place in maritime history. They carried on successful wars against the Saracens, Turks, and other nations, and sent their fleets into all parts of the known world. The first half of the fifteenth century was their most prosperous period ; they were then masters of the whole of the north of Italy, possessed Candia, Eubœa, the Morea, several of the Ionian Islands, besides the Grecian Archipelago, with Dalmatia, part of Albania, and Istria ; they had factories, too, all over the Levant, in Egypt, at Constantinople, and carried on the greatest part of the traffic between Europe and Asia. It was chiefly in Venetian vessels that the Crusaders, from all parts of the European continent, went to the Holy Land. They were a proud and ambitious people, delighting to call themselves, *and to be called*, the masters of the sea. Every *year they went forth*, in great pomp and state.

from amid the seventy islands on which the city of Venice is built, to marry the sea, as they termed it. Their *doge*, or chief magistrate, with the leading senators, in a magnificent ship, called the *bucentaur*, led the way; and when they had reached a point where the gulf opens into the Mediterranean, he dropped into the waters a gold ring, as a sign of the close union that existed between them and the great maritime republic.

There are no Venetian galleys on the waters now; all the pride and power of Venice is gone; like Genoa, another Italian State, which in the thirteenth century was strong enough on the ocean to wage a fifty years' war with her, she is now subject to the Austrian rule. We sometimes read of her black *gondolas*, that seem to have put on mourning for her downfall, gliding along the sluggish canals, amid the ruined palaces, emblems of former greatness, and we think how vain is human pride, how unstable human power. In the Crystal Palace at Sydenham, our readers may see one of these *gondolas*, a long, shallow boat, with a high carved prow, and a pointed stern, on which the *gondolier*, as the director of the boat is called, stands, and, by a series of skilful motions of the

single oar, urges it on with great swiftness. In the middle is a sort of cabin, like the body of a coach, or of a sedan chair, and in this the passengers sit, with the black curtains drawn around them, like mourners going to, or returning from, a funeral; and yet these gloomy-looking gondolas are the pleasure-boats of the Venetians. They are often richly carved and ornamented, inlaid with precious metals; but the prevailing colour is always black—a singular fancy, for which one knows not how to account.

We have spoken of the Genoese as a maritime people; fishermen and sailors are they, to a great extent, even in the present day. Their beautiful city, which lies at the foot of the Appenines, on the shore of a magnificent bay of the Mediterranean, they call *Genoa di Superba*—Genoa the Superb; and of old, in the spacious harbour rode proud fleets, and mighty *argosies*, as a collection of ships, especially richly freighted merchant-ships, is sometimes called, from Argo, Jason's vessel, of which we spoke some time back. The Genoese were *long the rivals* of the Venetians on the sea. A *hardy and enterprising* people, they, too, visited *distant regions*, and gained riches and renown,

as merchants and warriors. In the eleventh century, assisted by the people of Pisa, another Italian State, they drove the Saracens out of Corsica, and other parts thereabout, where they had established themselves; they also took part in the great Crusade under Godfrey of Bouillon, and obtained settlements in Palestine. They then turned their arms against the Moors, from whom they took the island of Minorca, and some Spanish cities. Their growing power excited the jealousy of their former allies, the Pisans, and quarrels ensued between the two States, which led to wars, which were terminated, in 1282, by the total defeat of the Pisans, of whom, in a great naval battle, 3000 were killed, and 13,000 taken prisoners to Genoa.

At the latter end of the fifteenth and the commencement of the sixteenth century, we find Spain and Portugal occupying prominent positions on the waters; their renown rests chiefly on the grand discoveries effected by their navigators of unknown portions of the globe. The expedition of Columbus, who, we must remember, was a Genoese, having been born in the State of Genoa somewhere about 1435, was fitted out by the King of Spain; it consisted of

three vessels and 100 men, and set sail on the 3rd of August, 1492. Columbus, it appeared, had made many voyages before this ; had deeply studied *geometry, astronomy, geography, and cosmogony* (that is, the sciences of measurement of the heavenly bodies, of the formation of the earth, and of the creation), and had become impressed with the belief that there must be land to the west of Europe, or that at least by that yet unexplored route he might reach India. It was only after repeated disappointments, having been treated as a madman by his countrymen, the Genoese, and by the King of Portugal, to whom he applied for assistance to carry out his grand scheme of discovery, and after having for eight years, during which he solicited the court of Spain, struggled against discouragements of every sort, that he obtained his object. Let my readers learn here a lesson of perseverance. Columbus felt that he was right, and was therefore determined to carry his point, and he did, too. And what was the result? One of the grandest discoveries ever made by man—a new quarter of the globe, that *had hitherto lain in darkness, unveiled to the rest of the world.* Columbus, however, did not *make this great discovery at once.* On his first

expedition, he found only the West India islands of St. Salvador, Cuba, and St. Domingo. He returned to Spain in March, 1493, and set sail again in September of the same year; he now discovered the islands called the Little Antilles, and formed settlements on that of St. Domingo. He performed his third voyage in 1498, and now touched upon the great American continent, running down the south coast, from the mouth of the river Orinoco to Caracas. His fourth and last expedition was undertaken in 1502, and this he pushed forward as far as the Gulf of Darien, which runs in from the Atlantic, and partly divides the north and south portions of America; the Pacific, you know, coming up on the other side, and leaving only a narrow strip, called the Isthmus of Darien, to join the two.

In the history of this early navigator there is much that deserves the attention of our readers. Both ashore and afloat he had to contend with difficulties, and to surmount obstacles sufficient to have made most men despair of success. His services to Spain, and to the world at large, were never, during his lifetime, *acknowledged*, and he died, in 1506, *overwhelmed*, it is said, with grief at the neglect

which he experienced, and infirmities, which there were none to soothe or alleviate. The honour of giving his name to the continent which he undoubtedly discovered was even denied to him; that was reserved for Amerigo Vespucci, a Florentine by birth, but engaged in the Spanish service, who, in 1497 or 1499, embarked in a fleet commanded by one of the companions of Columbus, named Alonzo d'Ojeda, and being a skilful pilot, and having also the then rare ability to describe well what he saw, he gave to the world an account of the great new continent, and his name became associated with it, and eventually attached to it in all geographical works published. This man made several voyages, and undoubtedly did much to spread and increase a knowledge of those western parts of the world.

Between 1496 and 1526 took place the voyages of Sebastian Cabot, a Venetian by descent, but a British-born subject; he it was who first touched on the coast of North America, probably somewhere about Newfoundland.

His second voyage was to the Gulf of Mexico; *his third* was an attempt to discover what *navigators*, up to the present day, have been *vainly endeavouring* to track out, viz., a north-

west passage to India; he seems to have entered Hudson's Bay, and given English names to several parts thereabout.* His fourth expedition was across the Atlantic, to the southern part of the great newly discovered continent; he explored the river Plate, or La Plata, as it is often called, with some of its tributaries, and endeavoured to form settlements in the country, but in this he could not succeed. He made several other voyages, some for Spain, and some for England, where he was living in 1557, on a pension granted by the Government for his public services.

In 1499 Vicenti Yanez Pinzon, who had previously sailed with Columbus, crossed the Atlantic in a south-westerly direction, and was forced by a violent tempest upon the coast of Brazil, where the people thought his boats were the children of the ship.

It was in the year 1513 that Balboa, a Spanish navigator, having crossed the Isthmus of Darien, saw the mighty Pacific rolling and flashing before him; he, probably, was the first European who had ever gazed on that magnificent spectacle.

In 1520, Fernando Magalhaens, commonly called Magellan, a Portuguese, who had the

command of a Spanish expedition, explored the southern part of the American continent, and gave his name to the most extensive strait on the surface of the globe, running up 200 miles between the American continent, and some islands which compose what is called *Terra del Fuego*, or the Land of Fires, a name given to it on account of the vast number of volcanic fires observed during the night.

These great nautical discoveries, made during a period of not more than fifteen years, caused great excitement in the Old World, as all but the newly found parts were called. Wonderful stories were told of the strange lands that seemed all at once to have arisen out of the sea. Gold and precious stones, and all things hitherto rare and difficult of attainment, were now to become plentiful and common. Every one was anxious to go on a voyage, and to get suddenly rich; and the small and slow results of patient industry were despised. Portugal and Spain, which profited most at the time by the new discoveries, were eventually the greatest losers by them; the great natural wealth of the Peruvians, *Mexicans*, and other South American nations, *excited their desire for its possession, and as they became avaricious, they became also un-*

scrupulous in the means of obtaining what they desired; the most horrible cruelties were practised on the native princes and people, and "they gained possession of vast treasures by the commission of atrocities at which justice and humanity recoil." So says a writer on this exciting period of maritime history; and he continues, "But all this wealth did not conduce to the welfare of Spain; for the acquisition of so much gold, without giving commodities in return, engendered a spirit of indolence which sapped the foundation of the nation's prosperity, and afforded to the rest of Europe a practical illustration of the lesson that 'industry is better than gold.'"

There is a proverb which says "Light come, light go;" and we have seen that the easily acquired wealth of Spain and Portugal did not make them prosperous in the long run. We are also taught that unfair gains never prosper; and all history confirms this lesson.

Besides the Spanish and Portuguese, the Dutch have been, in their time, great navigators and discoverers; they colonized many islands, both in the East and West Indies, and have *still* extensive possessions abroad. They have *taken an important part* in some of the Euro-

pean wars; and it is not many centuries since that an admiral of theirs, named Van Tromp, sailed with a broom at his masthead, to indicate that, as he boasted, he meant to sweep the seas clear of all who opposed him. But Holland has very few war-ships afloat now; and Spain, since the destruction of her great Armada, that came, in the reign of Elizabeth, to attack England, and was totally defeated and destroyed, has not held up her head as a maritime power. Once, the richest ships that sailed the seas were the *galleons* that passed and repassed between Spain and her American colonies, and often has the Greek pirate, and the Salee rover, laid wait for one of these tempting prizes, and, boarding it under cover of the darkness, stained the blue waters of the Mediterranean with the blood of its defenders, and carried it off in triumph to the fortified den of robbery; or, after taking out the cargo, and such of the crew and passengers as were spared for a life of slavery, bored holes in the bottom, and so sank it; this is called *scuttling* a ship. But neither Greek nor Moor may now carry on their trade of death and *plunder* on the waters with impunity. Since *the signal* vengeance inflicted on the Dey of *Algiers*, by the bombardment of his city by the

English, in 1816, the Moorish acts of piracy have almost ceased, and the Greeks and sea-robbers of other parts have found that they cannot escape punishment, and so have become more honest, or at all events more cautious, seldom venturing upon attempting any but the smallest captures. Acts of piracy in the Indian seas by the Chinese, and others thereabout, are still not unfrequent; but their clumsy vessels are no match for the armed steamers which keep a vigilant look-out in that direction, and they are fast becoming aware that their business is a very unsafe one.

Of old, the Scandinavians, as the people of Denmark, Sweden, and Norway were called, were great sea-robbers; they termed themselves Sea Kings, and boasted of their misdeeds. The Danes, you know, paid many visits to these islands, and obtained a footing here for awhile; they laid waste whole tracts of country, and destroyed cities, towns, and villages; and glad enough our forefathers were to get rid of them. Danish, Norwegian, and Swedish vessels still come to our ports, and now, strange to say, we give them a hearty welcome; for we want the *timber*, and the *iron*, and other natural products of their countries, and we want them,

too, as customers for our manufactured goods. Now they are honest and industrious traders, and they are liked, and flourish accordingly.

The modern Turks and Egyptians have their ships of war, and merchant-vessels afloat, but they can scarcely be called great maritime powers. The stripes and stars of the United States of America float proudly from the mast-head of several fine frigates and many noble steam-ships, and the mercantile marine of that as yet infant republic bids fair one day to rival that of our own country. Prussia has also many merchant-ships on the seas; and of late years the Russian eagle has been more and more frequently seen, the royal, or as we should say imperial, navy of that vast country having grown to formidable dimensions, although, being shut up in her spacious harbours and inland seas, the rest of Europe have seen but little of it.

And France! here we have, close to our own shores, a maritime power, second only to ourselves, and with whom, happily, we are now in close alliance. Let us pray that this may continue, and that two nations so closely united, *alike by position and interest*, may never again, *as they have done*, wage war with each other.

We are told by some old geographers, that the white cliffs of Calais and Dover were formerly united by a bar of sand and rock, which at low water might be crossed ; history does not vouch for the truth of this, and it may be a mere fable or fancy ; but we will suppose that it was so, and that the waters of the Atlantic, like strifes and contentions between the two nations, rushed in, and severed the tie which bound them to each other ; but they are joined again now, not by the shifting sand, not by the flinty rock, but by a strong though invisible tie, which, if broken, can be easily repaired ; it passes beneath the waters, and along it fly daily, hourly, sometimes minutely, messages of friendship and mutual good will. Need we say that this is the electric telegraph ; may it never carry other words than those of amity and kindness.

We have now to speak of the navigators of our own country, one of the earliest and most celebrated of whom was Sir Walter Raleigh, whose exploits and discoveries at sea obtained for him great favour in the eyes of Queen Elizabeth, and the nation at large. *That part of North America called Virginia was discovered and colonized by him, and so*

named in honour of the Virgin Queen, in 1584. It was from thence that Raleigh first brought tobacco into England. We are also indebted to him, it is said, for the introduction of a more wholesome and useful plant, the potato, which was obtained from South America, where Sir Walter discovered, and took possession, for his royal mistress, of the country called British Guiana. Raleigh fitted out several ships at his own expense, and did much mischief to Spain, with which country we were at war; he, with a squadron which he commanded, contributed largely to the defeat of the famous Spanish Armada. When King James ascended the throne, he fell into disgrace, and was, through Spanish influence, brought to trial for an imaginary offence, and found guilty of high treason, for which he suffered death by beheading, in 1618.

Sir Francis Drake was the first English navigator who sailed round the globe; he was in a manner born to the sea, being the son of a sailor. It was in the year 1577 that he set out with five small ships, and 146 men, from *the port of Falmouth*; he went through the *Straits of Magellan*, thence along the coast of *Chili and Peru*, to North America, where he

took possession of a country which he called New Albion, after his native land, which was formerly, much more than it is now, termed Albion, on account of the whiteness of its chalky cliffs; the word being derived from the Latin *alba*, white. From North America Drake sailed across the Pacific Ocean to the large Indian islands, Molucca and Java; and then home round the Cape of Good Hope. This voyage lasted two years and eleven months, and its successful termination was a cause of great public rejoicing. Drake was made a knight by Queen Elizabeth, who honoured him still further, by dining on board his ship, as she lay in the river, at Deptford. In 1596, he undertook an expedition against the West Indies, in which he was partly unsuccessful, and returning from which he died of a fever. To Drake some have assigned the honour of having introduced the potato here. Like Raleigh, he did immense mischief to the Spaniards, and assisted in the destruction of the Armada, during the attack upon which he acted as Vice-Admiral of the British fleet, the Lord High Admiral having been Charles, Lord Howard of Effingham, under whom served also, on the same occasion, Sir John Hawkins and Sir Martin

Frobisher, who were both distinguished British seamen and navigators; the former had afterwards, conjointly with Drake, the command of the West Indian fleet, and like him, too, he fell a sacrifice to the climate; this was the first commander of our country who engaged in the abominable slave traffic. He founded a hospital for decayed seamen at Chatham, Kent, and so, perhaps, endeavoured to atone for some of his misdeeds in this way, although dealing in human flesh and blood was scarcely thought a sin in his day. Frobisher also accompanied Drake and Hawkins to the West Indies. In 1594, being sent to Brittany with a fleet to assist Henry IV. of France, he was wounded at the siege of a place near Brest, brought home his fleet in safety, and died at Plymouth.

Since the reign of Elizabeth, there have been many distinguished men to uphold and extend the maritime fame of Britain. Between the years 1768 and 1779, Captain James Cook performed three voyages round the world, and added largely to our knowledge of the South *Pacific islands*, at one of which, named Owhyee, *he was killed*, in a quarrel with the natives. *Then recently*, the names of Bligh, Parry,

Ross, and Franklin occur in our annals of maritime adventure and discovery. To the latter name a painful interest is attached, on account of the total loss of all employed in the expedition, consisting of two ships, which, under the command of Sir John Franklin, left England on the 23rd of May, 1845, and has not since been heard of, although all possible search has been made by sailors of this and other countries, in the desolate arctic regions—the realms of everlasting ice and snow—amid which they must have perished.

A long list of British admirals and famous sea captains might be given, beginning with those of the reign of Elizabeth already mentioned, including Sir Cloudesley Shovel, and others who took part in the great French wars which have, unhappily, prevailed; and coming down to Dundas and Napier, and others of our own time. But this is unnecessary. We should rather dwell upon the peaceful triumphs of commerce, than describe great naval battles and victories. Enough, and more than enough, has been said about “the meteor flag of England,” and “*Britannia rules the waves*.” We are sometimes inclined to say with the *master*, who found, when afloat, that the

273825

motion of the said waves caused in him extremely unpleasant sensations, "what a pity it is she does not rule them straighter."

We are proud of the position which our country occupies among nations; we rejoice in her prosperity, and we pray that it may continue; the rather, as we believe its continuance will conduce greatly to that of the whole world. We admire the perseverance, the skill, and the energy displayed by those who sail or steam beneath our flag, to all parts of the world, but we shudder at war, and all its terrible accompaniments; and we firmly believe that a nation may be more safe, and more prosperous, in proportion as it cultivates the arts of peace; and, acting with justice, kindness, and Christian charity towards all men, depends for protection, in every case of danger, on the power of Him who holds the seas in the hollow of his hands, and fixes the boundaries of the raging floods. To Him should sailors especially often direct their thoughts and prayers; of his providential dealings with man they have most reason to be assured; for truly, as the Psalmist said, "*they that go down to the sea in ships, and do business in great waters, these see the*

works of the Lord, and his wonders in the deep.”

It only remains for us now, before concluding this section, to say a few words about FISHERMEN, who may be said, like sailors, to belong to the class called *amphibious*; a term applied by naturalists to those animals which can live equally well in air or water. An English poet has said—

“ A perilous life, and sad as sad can be,
Hath the lone fisher on the silent sea.”

And, in truth, the life of a fisherman is one of great peril and hardship; he goes forth in his little boat, upon the unstable ocean, to draw the net and cast the line, and frequently remains days, and sometimes weeks, away from his humble home, often built upon the verge of the beach, of wreck timber, or an old boat sawn in half, and set up on end, with perhaps large stones and lumps of chalk for walls, and black sea-weed for a roof-covering. This is a very uncertain mode of gaining a livelihood; there are many seasons when he cannot venture forth at all, and when he can, success does not always crown his efforts. Too frequently does it happen that he leaves home never to return again; his lifeless body may be washed upon

some far-away shore, or float out to sea, and be eaten by the voracious monsters of the deep. The men engaged in the British fisheries are among the most industrious, hardy, and useful of our native population, and their calling, we must remember, is of great antiquity. In all ages there have been fishermen, and many a man that has proved a blessing to his country, and an honour to the human race, has been found casting his net into the sea, as well as Simon and Andrew, whom the Saviour of the world took from their humble occupation, to make them "fishers of men." They afterwards went about the world spreading the net of the gospel of salvation, that they might catch souls. Let my readers think of this when they see a fisherman, and however rude he may be in manners, however poor in outward appearance, with his rough pea-jacket, tarpaulin trousers, and "sou'-wester," let them believe that there beats an honest, manly heart within, and that the outer man has been rendered rough and rugged by buffeting with the winds and waves, by exposure to all sorts of *weathers*. Let but the signal gun of distress be heard in the offing, and it will soon be seen what a brave, humane man he is; the boat

will be launched, though the waves run mountains high, and away he goes to save the lives of the shipwrecked mariners, or perish in the attempt.

QUESTIONS.

- | | |
|--|--|
| <p>What is the term <i>mariner</i> derived from ?
 What are <i>marines</i> ?
 Who was <i>Neptune</i> ?
 Who was <i>Jason</i> ?
 What fish has been called the first sailor ?
 What is its scientific name ?
 What is the earliest expedition of which we have any record ?
 Who were the <i>Phanicians</i> ?
 Where had they settlements ?
 By whom is it likely that the ships of King Solomon were manned ?
 How far north did their ships come ?
 What other ancient people are mentioned as early navigators ?
 Where did King Solomon send his fleet ?
 What Persian king fitted out a naval armament, and for what purpose ?
 What two Greek islands sent ships first into the Mediterranean ?
 Who are said to have been first masters of that sea ?
 What other Greek island had previously ships there ?
 Who was <i>Scætes</i> ?
 What did he do ?
 At what date was this ?
 What great conqueror had fleets to assist his armies ?
 Who were <i>Hanno</i> and <i>Hamilear</i> ?
 Who was <i>Eudoxus</i> ?
 What did he ?
 Who was <i>Pytheus</i> ?
 How far north did he sail ?
 What did he say about Britain ?
 In what century does the history of navigation commence ?
 With what people ?</p> | <p>Who followed them ?
 When did the Saracens lay siege to Constantinople ?
 What places had they previously taken ?
 When were they masters of the Mediterranean ?
 What European country did they conquer ?
 What did Abderrahman do ?
 Who took his ship ?
 What was the general idea of the form of the earth ?
 Who wrote a book to prove that it was not a globe ?
 What was Massudi's idea of it ?
 Who were the <i>Venetians</i> ?
 When were they most prosperous ?
 What lands and settlements had they ?
 What was their character ?
 What annual ceremony did they observe ?
 To whom are they now subject ?
 What are their pleasure-boats called ?
 Describe one.
 What is the situation of Genoa ?
 What do the Genoese call their city ?
 What is an <i>argosy</i> ?
 With whom did the Genoese contend ?
 By whom were they afterwards assisted ?
 What did they accomplish ?
 In what crusade did they take a part ?
 Against whom did they bear their arms ?
 With what result ?
 Did the Pisans remain friendly with the Genoese ?</p> |
|--|--|

- To what extent did they suffer in the contact with them?
 At what period did Spain and Portugal become maritime powers?
 On what does their renown chiefly rest?
 Where was Columbus born, and when?
 Who fitted out his first expedition?
 When did it sail?
 With what idea was Columbus impressed?
 To whom did he first apply for assistance?
 What did Columbus discover?
 Did he make the great discovery at once?
 What was the result of his first voyage?
 When did he return to Spain?
 When did he set out on his second voyage?
 What was the result of that?
 What was the date of his third voyage?
 On what land did he touch?
 How far south did he go?
 What was the date of his fourth voyage?
 How far did he go?
 When did Columbus die?
 Were his services appreciated?
 Who gave a name to the American continent?
 Of what country was he?
 With whom did he sail?
 Who was *Sebastian Cabot*?
 In what years did his voyages take place?
 Where did he go on his first?
 Where on his second?
 Where on his third?
 Where on his fourth?
 By what courts was he employed?
 Where was he living in 1557?
 Who was the next navigator mentioned?
 Where did he go in 1499?
 With whom had he previously sailed?
 What was the date of Balboa's voyage?
 What isthmus did he cross?
 On what ocean did he look?
 Who was *Magellan*?
 What land did he explore?
 Where is the strait, to which he gave his name?
 What does *Terra del Fuego* mean?
 Why was it so called?
 Over how long a period did the great western discoveries extend?
 What effect did they have on the people of Europe?
 What countries were most enriched by them at the time?
 Was their prosperity lasting?
 Why not?
 What lesson do you learn from this?
 What places did the Dutch colonize?
 What was the name of their admiral?
 What boastful act is related of him?
 In whose reign did the Spanish Armada attack England?
 Was it successful?
 Are Holland and Spain great maritime powers now?
 By whom were the merchant ships of the former country frequently taken?
 What is *scuttling* a ship?
 Do the Greeks and Moors still carry on their piracies?
 When was the city of Algiers bombarded, and by whom?
 Who are the chief pirates in the Indian seas?
 Who were the *Scandinavians*?
 What was their character of old?
 What northern people frequently invaded these islands?
 Do they still continue to visit them?
 Why are we glad to see them?
 Have the modern Turks and Egyptians much power on the sea?
 What is the flag of the United States?
 What vessels is it seen floating over?
 Has Prussia many merchant ships afloat?
 Has Russia a powerful fleet?
 Is France a great maritime power?

What do certain old geographers say about the two countries?

What is their line of connection now?

Who was one of the oldest and most celebrated of English navigators?

What part of North America was colonized by him?

What article of large consumption did he introduce from thence?

What other plant is he said to have introduced?

Of what South American country did he take possession?

With whom was he high in favour?

In what great naval victory did he take a part?

When did he fall into disgrace?

When did he die, and what was the manner of his death?

What was the name of the first Englishman who circumnavigated the globe?

When did he set out on his first expedition?

What course did he take?

Of what country did he take possession?

From whence is the term *Albion* derived, and why is England so called?

When did Drake go from port?

How long did his voyage last?

How was he honoured on his return?

What rank did he hold in the British fleet which defeated the Armada?

Where did he go in 1596?

When did he die, and where?

Who was the Lord High Admiral then?

What other celebrated naval commanders took part in the action?

Which of them went with Drake to the West Indies?

In what traffic was he, the first Englishman, engaged?

What hospital did he found?

Where was Frobisher sent?

What was the result to him?

When did Captain Cook perform his voyages?

How many times did he sail round the world?

Where was he killed?

What other naval commanders are mentioned?

When did Franklin leave England?

Did he return from this expedition?

Where has search been made for him?

What admirals, of a more recent date than the time of Elizabeth, are mentioned?

Quote a passage from the Psalms, in reference to sailors.

What does *amphibious* mean?

What kind of life is that of the fisherman?

What is the character of those engaged in the British fisheries?

Which of the Apostles were fishermen?

What did our Lord say he would make of them?



SECTION IV. *Fish and Fishing.*

WE have just been speaking of fishermen; let us now talk about what they catch—the finny tribes of the salt sea, their peculiarities of structure, habits of life, and the means by which they are taken. And, first of all, let us inquire what the word *FISH* really means, for there is often a misunderstanding on this head. We will go to the great authority, Johnson, and hear what he says: a fish, he tells us, is “an animal that inhabits the water;” and so, no doubt, it is, but all animals that do this are not fish, therefore we want some clearer or fuller definition of the term; and here we have *it* in a book called a Cyclopædia:—“A fish *may be defined* as a vertebrate animal (that is

an animal having a vertebra, or back-bone), breathing through the medium of water, by means of branchiæ, or gills, having one auricle and ventricle to the heart, cold red blood, and extremities formed for swimming." This is a scientific description, which perhaps our readers will not quite understand; we will endeavour to make it plain to them. All animals are divided into two great classes, called *vertebrate* and *invertebrate*; that is, those which have back-bones like ourselves—all kinds of beasts, birds, reptiles, and fishes—and those which have not, like insects, worms, and those creatures which inhabit shells, etc., and which, having no internal skeleton, are called soft-bodied animals. The *vertebra* is that bone which forms, if we may so speak, the main stem of the skeleton; on the top of it rests the head, on either side branch out the ribs, which form the framework of the body. It is supported on two legs, or four, as the case may be; what are the fore legs of *quadrupeds*—that is, four-footed animals—are the arms, or wings, of *bipeds*, or two-footed animals; or there may be neither legs nor arms, as in fish and serpents. This *vertebra* is composed of a number of short joints, or pieces, which, being loosely connected, enable

the animal to turn or twist in any direction; hence the name, derived from the Latin *verto*, to turn or bend.

Now we know what a vertebrated animal is, such as a fish, that can twist and wriggle, and slip through our fingers, unless we hold it very tightly, by the exertion of a muscular power, which sets in motion the joints of the backbone, and, by that means, the whole of the frame. Then it breathes by means of *gills*; we have *lungs*, which are porous, something like a sponge, and when we *inhale*, or draw in the air, they become filled, or expanded; then, by a muscular pressure, the air, whose oxygen has passed into the blood, is *exhaled*, or driven out again, and a fresh portion drawn in—and this is breathing. Fishes also breathe; but they have an apparatus fitted to abstract the oxygen from the water, instead of the air. This is called the *branchiæ*, or gills; and very curious it is, consisting of a number of what are termed *laminæ*, fixed in an arched bone, on each side of the head. *Lamina* is a Latin word, signifying a thin plate, or scale, the termination *æ* makes it plural. Here, then, we have *many thin scales*, which look like little pieces of red rag, fastened together at the top. If we

lift up the little bony plate at the lower part of the side of the head, we shall see the gills, presented to us edgeways; the water, drawn in at the mouth, passes between these, and out at the side openings, having had a portion of its oxygen absorbed by the innumerable minute blood-vessels which cover the surfaces of the *laminæ*, and spread from thence, or ramify, as it would be termed, throughout the whole system. All this is very wonderful.

Then, a fish, we are told, has one *auricle* and *ventricle* to the heart: these are small hollows, into the first of which the blood, after it has circulated through the body, flows, from thence it passes into the second, and from these is pumped out, if we may so speak, through the arteries, to be again, after it has obtained a fresh supply of oxygen from the gills, circulated through the system. Fishes, we see, have but one auricle and ventricle to the heart, human beings have two; the former are called cold-blooded, the latter warm-blooded animals. In birds, the temperature of the blood is much higher than in man; in fish, much lower.

The term, "finny tribes," is often applied to these dwellers in the deep. Do our readers know how many *fins* they have, and what is the

use of those appendages? Most usually, the number of fins is seven—viz., two *dorsal*, or back fins; two *pectoral*, or breast fins; two *ventral*, and one *anal* fin. The first of these is situated quite at the under part of the body, about where it is joined to the head; and the last, a little before the commencement of the tail, which is sometimes called the *caudal* fin, and is the principal organ of motion, the other fins being chiefly used to balance and guide the body. They consist of a thin skin, or membrane, supported by rays, which rays are of two kinds: *spinous*, consisting of a single bony spike, generally hard and sharp; or *flexible*, that is, divided into several finer points, like bunches of stout hairs. Both these fins and the tail can be moved in any direction, at the pleasure of the animal, which by means of them is enabled to glide and turn in a peculiarly graceful and easy manner, or to dart forward with great swiftness.

The bones of the fish are much less solid and weighty than those of any other animals, except birds, which are hollow; and the whole frame is light and buoyant—that is, especially *adapted* for floating. This term is French; *bouée*, from *bois*, wood, which will not sink.

Hence we have also *buoyancy*, and *buoy*, such as is often seen floating, as a mark, above a sand-bank, or other spot which it would be dangerous for a vessel to approach. Ships also carry life-buoys, to throw overboard, in case of an accident, that persons, clinging to them, may be supported, until help can reach them. A fish, then, is very *buoyant*, and has a form beautifully adapted for dividing and passing through the waters. Ships and boats, you will see, are made after this model; the pointed bow, the head gradually swelling out, and then again decreasing, and terminating at the stern—the tail: human ingenuity could contrive nothing better than this, nothing so good. Those swift-sailing vessels which are called “clipper-built,” are as much like a fish in shape as possible.

Those beautiful *scales* which cover the body of the tenants of the deep, and shine and gleam like silver, may be considered as the animal's coat armour; they are all directed backwards, so as to offer no resistance to the water.

Only the lower jaw of a fish is moveable, and the *teeth* are what are called osseous, or bony; they are usually of a simple, pointed form, and very numerous, not being confined to what may

strictly be called the jaw, but distributed over the other bones of the mouth, and sometimes even on the tongue; in some species, they are planted very irregularly, in others, in perfect order. Fishes have *eyes*, and large staring ones, too; for the most part, they are placed laterally—that is, on the side of the head; although sometimes, in species which frequent the bottom of the sea very much, they are directed *upwards. In some species they are situated at the extremities of two side projections; this is the case with the Hammer-headed Shark, which it would be quite a mistake to call handsome. The range of vision in fish does not appear to be great, although the sight is acute for a short distance.

There can be no doubt that fishes exercise both the senses of *taste* and *touch*, although the organs by which they do so are not very perceptible; they also, it is likely, *smell*, and certainly *hear*, being sometimes attracted, or driven away, by certain sounds, which are disagreeable or otherwise to them. They have no organs of *voice*, yet are some of them not altogether mute. The Tunnies, which swarm in vast shoals, *make* a loud hissing noise; the Ground Ling *also emits* a similar, sound when handled.

There is one fish, which gives a kind of shriek when taken out of the water ; among the Seals, there is one which lows like an ox, another which grunts and snorts, and another which moans piteously, and even sheds tears, when in distress. Many others might be named as exhibiting pleasurable and sad feelings, by the utterance of sounds. That they are capable of a high state of enjoyment, no one who has watched them sporting amid the watery depths, can for a moment doubt ; and the careful solicitude manifested by whales and seals, and other fishes, for their young, proves that, if cold-blooded animals, they have yet warm affections. The character which has been generally attributed to them is that of great voracity, and hostility one towards another ; but this is not correct. In the main, they are harmless, sociable, sportive creatures ; doubtless, the larger prey upon the smaller ones, but this is only in accordance with the law which prevails all through the world of animated nature. Man feeds upon the ox and the sheep, and other of the inferior animals. True, he does not catch them, and eat them alive ; because he has been taught differently, and has finer tastes and sensibilities than the fish, which is only guided by

what are called its natural instincts; it *feels hungry*, and it seizes that which comes most readily to hand to satisfy its hunger, and the chief business of its life is to find sufficient for this purpose; hence it is almost constantly, even in its sport with its fellows, hunting for food, as are all other wild creatures, and the benevolence of God is nowhere more visibly displayed, than in the enjoyment which this pursuit and capture of prey affords. Unlike many of the engrossing pursuits of man, it is a *pleasure* as well as a *business*. The fishes work and play at the same time; they eat when they are hungry, and they rest when they are tired; and this is what we cannot always do. Yes, it may be said, and presently they get eaten themselves. True, but they know nothing about it beforehand; up to the moment of death they are perfectly free from fear and care, and their suffering is soon over. Some of them, no doubt, have long-continued disease, and some die in a gradual, lingering manner, especially those which are taken for the sustenance of man; but the former cases are very rare, and the latter need not be so common as *they are*. Man makes it so, God does not order *it*; for although He gives the creatures for our

use and sustenance, yet it is with such injunctions to mercy, and tender regard to all things that can feel pain and suffer anguish, that if we obey Him, we shall be very careful to kill in the speediest and easiest way possible the creatures that we require. Let us, then, keep no fish out of water longer than is necessary; and this brings us to inquire why it is that some fish do live so much longer out of their native element than others. It has been observed, that those which are accustomed to come most frequently to the surface of the water, die most quickly when taken out of it, while those which lurk chiefly at or near the bottom, retain life for a long time when on land. Herrings, mackerel, whiting may be mentioned, as examples of the former class; and soles, plaice, flounders, and other flat fish, of the latter: these we often see flapping their fins and tails, and even springing out of the basket which contains them, long after they have been caught; the others are perfectly motionless and lifeless in a very short time after they have reached the shore, even if they are brought there alive.

The reason appears to be, that those fish which are the most active and lively in the

habits and movements, consume more oxygen than the others, and their gills not being adapted for abstracting it from the air, they the sooner feel its deprivation. We should say that the fish dies for want of water; whereas, in reality, it dies for want of air, and, curiously enough, does so directly it is brought out of the former, and into the latter element: it cannot breathe dry air, but only that which forms a component part of water. It may perhaps be difficult for our readers to comprehend all this; but let them endeavour to bear the facts in mind, and they will serve to explain many things which they may observe in the peculiar habits and adaptations of fish, the different kinds or varieties of which we will now briefly describe.

The WHALE. What a large creature is this! It swims about in the deep sea like a floating island, frequently measuring from eighty to a hundred feet in length. It is spoken of in Scripture as the Leviathan; the allusions to it are four in number; our readers should find them out. But, properly speaking, whales are not fish, they being warm-blooded, and breathing through lungs; hence they are *obliged* frequently to come to the surface to *breathe*; they also bring forth their young

alive. All true fish are *oviparous* (that is, lay eggs), these animals are *viviparous*; *ovum* is the Latin for egg, *vivum* for life, and here you have the origin of the two terms; add to either *pario*, to bring forth, and you have the meaning complete. Whales, then, are viviparous, warm-blooded animals, and they belong to the class called *mammalia*, in which are placed all those creatures which suckle their young; the term being derived from the Latin *mamma*, the breast. There are several kinds of whales, the largest being the common or Greenland Whale, which is found in great numbers about Spitzbergen and other northern countries, to which many ships are annually despatched, for the purpose of taking them, from England, Holland, and other parts of Europe, as well as America. The most valuable part of the animal is the *blubber*, or fat, from which the oil is extracted, a single capture sometimes yielding as much as 4000 gallons; the product next in value is what is called the whalebone, although it forms no part of the skeleton of the animal, and is quite a different substance from its other bones, being more like horn in its nature. The whale has no teeth to masticate or chew its food, and swimming along with

open mouth, would be likely to have a larger fish than it could swallow go into the somewhat narrow passage of its throat; to prevent this, the upper jaw is furnished with a series of projecting *laminæ*, or plates, of great length, which meeting and crossing each other, form a kind of coarse strainer, whose framework is the whalebone, employed, as our readers know, for many useful purposes; this is sometimes called *baleen*: from a single jaw have been taken as many as eight hundred pieces.

The scientific name of the Greenland Whale is *Balæna mysticetus*; there is another species found in the South Seas, called the Black Whale, by naturalists *Balæna Australis*. These enormous creatures feed chiefly upon minute marine animals, of which they must swallow immense numbers, to support such huge mountains of fat and flesh. Notwithstanding their size, they swim with great rapidity, especially when struck with the harpoon, or iron dart used in their capture, the line attached to which is drawn out of the boat so swiftly, that it would catch fire with the friction were it not kept wetted; this line is sometimes run out to *the extent* of a mile or more, and then the *boat is dragged* with great velocity through

the foaming waters by the wounded and maddened creature, which cannot remain very long under water, and on coming to the surface to breathe, is again struck, perhaps fatally, and after lashing the waves into foam with its forked tail, which has been known to break a strong boat in halves, as if it were a child's toy, and dyeing the sea for miles with its blood, and spouting up far into the sky two jets or streams of water from the blowers, as the holes in the top of its head are called, it floats a lifeless mass, and is towed to the ship, to have the *blubber* and *baleen* cut out. Whale-fishing is very dangerous and exciting employment, and there are no more hardy and adventurous sailors than those who go forth in pursuit of this monster of the deep, which, unless attacked, is harmless enough. Besides the two kinds mentioned, there is the CACHELOT, or SPERMACETI WHALE, whose Latin name is almost as long and ugly as itself—*Physeter macrocephalus*, the latter term meaning, great-headed. This animal has teeth, but on the lower jaw only, and its throat is very wide ; so that if the translation of the Scripture is correct in calling that a whale which swallowed Jonah, *this must have been the species.* It does not

yield so large a quantity of oil as the above kinds, but it is purer and more valuable, being called sperm oil; neither has it any whalebone to offer, but in its immense barrel-shaped head is a great quantity of an article called spermaceti; in Latin, *cetaceum*. Hence *Cetacea* is the name given by some naturalists to the whole genus of animals to which this species belong; there are other species of whales, but those spoken of are the most common.

The DOLPHIN is another of the sea mammalia, about which wonderful stories are told; its Latin name is *Delphinus delphis*. It measures from six to ten feet in length, has a long snout, like a beak, on which account it is sometimes called the Sea Goose; a very large head, and roundish body, gradually tapering off to the tail, whose end branches out into a crescent shape; it has eight small teeth in each jaw, and three fins, one *dorsal* and two *pectoral*. It is chiefly found in warm latitudes, and poets have told us that it is very fond of listening to music; also that, when captured and in its death agonies, its skin assumes all the colours of the *rainbow*; but this does not appear to be true, *a dingy black and white*, and a mixture of the *two*, being all the tints of which it can boast.

The PORPOISE, called *Delphinus phocæna*, likewise belongs to this family (the *Cetacea*), being a near relative of the dolphin, which it somewhat resembles; the snout, however, is more obtuse, or blunt, being something like that of a hog. The name of this animal appears to be composed of the two Latin words *porcus*, a hog, and *pisces*, a fish: it is often called the Sea Hog. The porpoises swim in large shoals, and leap and gambol about in a most extraordinary manner; we may frequently see them not far from the shore, and up tidal rivers, poking up their black snouts, and even leaping quite out of the water, making all the time a loud snorting, or blowing noise, which in calm weather may be heard at a great distance; they are generally on their hunting expeditions after the mackerel, herrings, salmon, or other fish, which they frighten and scatter, so that they are not liked by the fishermen, whose nets, too, they often break in their eagerness to get at their prey. They measure from four to eight feet in length.

The GRAMPUS, or THRESHER, as it is sometimes called, is but a species of Porpoise, although much larger than the common kind, being usually from twenty to twenty-five feet

in length; it is a great enemy to the whale, which, meeting in large numbers, it will sometimes attack and devour. The Grampus sometimes, though rarely, visits our coasts, one of several which ascended the river Tay, in Scotland, a few years since, was taken; it weighed five tons, and realized to the captors £40.

The NARVAL, or NAWVHAL, as it is variously spelled, differs from the rest of the *Cetacea* in having no teeth; but instead thereof, a long pointed horn, or tusk, which is very white, and hard as the finest ivory; it is what is called spirally striated—that is, twisted like a screw from the base to the point; sometimes there are two of these horns, one on each side of the head, but when this is the case, they are generally of different lengths, that on the left side being the longest. When the animal is attacked, it uses this weapon with great power and effect, and many a battle has the Greenland and Norwegian fisherman with the fierce Narval, amid the rough waves of the northern seas. The Sea Unicorn, as it is sometimes called, on account of its horn, is a prize worth taking, being from twenty to thirty feet in length, and *yielding a very fine oil*; the flesh is also much *prized as an article of diet*. *Monodon monoceras*

is the scientific name of the animal; these two words come from the Greek, the first means single-toothed, and the latter means a single horn, so that one seems but a repetition of the other. But three instances are recorded of the Narval having visited the British coast. The first was in 1648; the second in 1800, when the specimen, measuring twenty-five feet in length, was taken; and the third in 1806. The body of the animal is of a pointed oval shape; its colour a dusky white, with grey or dingy black roundish spots; the skin resembling that of the whale in texture and thickness; the breadth of the forked tail is from fifteen to twenty inches; it has no dorsal fin, but a sharp ridge running down the centre of the back; the spiracle, or blow-hole, through which it spouts up the water, is on the top of the head.

The SHARK.—We now leave the *Cetacea*, and come to the true fish, beginning with the most ferocious and destructive of all the inhabitants of the deep—happily, very rarely seen near our own shores. These voracious sea-monsters belong to the order of fishes called *cartilaginous*, because the bones of their skeleton are soft, like gristle, or cartilage;

nothing can be more frightful and hideous than is their general appearance, which in itself is sufficient to excite terror, without the associations of death and mutilation connected with it. In the tropical seas, sharks grow to an immense size, and on the shores which they frequent, it is most perilous to enjoy the luxury of a bath; their jaws are so strong, that they have been known to cut a man clean in two at a single bite; and the dimensions of the throat may be judged from the fact that an entire human body has been found in the stomach of one: everywhere they are dreaded and shunned by the finny tribes, as well as men. They are called *carnivorous*, from the Latin *carnus*, flesh, on which they entirely feed; they have the most formidable apparatus for devouring of any animal or creature, the teeth being thickly set, and pointed like spikes; in some species they are so numerous, that the whole mouth is lined with them; they are all used for tugging and tearing, more than for grinding, the food being swallowed entire. *Squalus* is the scientific name of the Shark genus. Anything which is filthy, foul, unsightly we call *squalid*, and we speak of *coarseness*, want of cleanliness, as *squalor*; these

are properly Latin words, which have been adopted into the English language, and you will understand by them why the above generic name is applied to the sharks, whose skin is rough and filthy-looking, being what is called *coriaceous*, that is, covered with hard lumps like corns; sometimes *tuberculated*, that is, beset with small swellings or pimples, called *tubercles*, intermixed with spines and scaly plates, presenting the appearance of some loathsome form of disease. The substance called *shagreen* is prepared from the skin, and that of other animals of the same cartilaginous order.

The sharks, too, have great ugly heads, generally wider across than the body, sometimes shaped like a flattened barrel, sometimes, as in the hammer-headed species, like a huge hammer, with the body for a handle, and then the snout projects a long way over the mouth, so that the animal cannot seize its prey without turning over on its back; but we should not object to this arrangement, for it enables many a poor swimmer for his life, both man and fish, to escape the jaws of the devouring monster.

The great White Shark, which naturalists call *Squalus carcharias*, sometimes weighs nearly two thousand pounds; the French call

this *Requin*, deriving the term, as it has been said, from *requiem*, a death song, because this dire monster is so intimately associated with death and destruction. Such is the Shark; a creature that no one could view, nor even think about, without a thrill of horror, and yet the Almighty created it to swim in the deep waters for some wise and good purpose; this we must believe, although we may not be able quite to understand the benevolent end which its existence answers.

The DOG-FISH, whose scientific name is *Spinax acanthias*, both terms having reference to the spiny or prickly nature of its outward formation, is a small species of shark, which is often found upon our coasts in great numbers, in pursuit of haddocks, cod, and other fish. They are accompanied on their hunting expeditions by their young, when not six inches long; the full-grown fish measures about two feet. As many as 20,000 of these dog-fish have, it is said, been taken at once in a Cornish net called a *seine*; they have slender bodies, a cleft or divided tail, and a head something like that of a dog. This animal has a singular mode of defence; if attacked when in the water, it bends itself in the form of a bow, and

then by a sudden motion directs the spines with which its back is armed in such a way as to strike the offending object; and so accurately is this done, that if a finger be placed on its head, it will be struck by one or more of these spines, while the animal itself remains untouched by them.

There is sometimes seen on the British coasts a species called the Fox-tail Shark; this has the upper division of the tail much lengthened, and the snout not broad and flattened, but conical; that is, round and pointed.

The eggs of some sharks, and of several other *cartilaginous* fish, are deposited in horny cases, of an oblong shape, lengthened into a narrow string, as it were, at each of the four corners. We may often pick up these cases among the heaps of sea-weed on our shores; the fishermen call them Mermaids' Purses; those which are most frequently found are termed Skait-barrows, belonging to the SKAIT, or MAID, called by naturalists *Raia batis*; this is a member of the *Raidæ* or Ray group of the cartilaginous order. It is a curiously shaped fish, having a broad flat body, terminated by a long prickly tail; the head terminates in a blunt point, but you cannot tell where it begins, although the staring

eyes are prominent enough. Great numbers of this fish are caught, and its flesh is eaten by the poorer classes, although it is coarse and ill-tasted: it is much used as bait for other fish. An old English naturalist, named Willoughby, mentions a skait so large that it would have served 120 men for dinner; and it is believed by some that the fish of this kind are among the largest inhabitants of the deep, remaining generally at the bottom, where net or line cannot reach them. We see only the dwarfs and juveniles.

There are several other of the cartilaginous fishes, such as the THORNBACK, which closely resembles the skait in general appearance; the TORPEDO, or ELECTRIC RAY, whose head and body, all in one, form a nearly perfect disc, or circle, out of which the two dorsal fins and tail project in a very singular manner. This is sometimes called the Cramp-fish, on account of the peculiar sensation which its touch produces, being like the shock of an electrical machine; this power is, no doubt, given to the creature for protection against its enemies, as well as to enable it to secure *its prey*. Several other inhabitants of the *deep* are also thus gifted, in a greater or

lesser degree; as the Electrical Eel, found in the pools of South America, which has been known to stun a horse, and render him powerless. Much like an Eel in shape is the curious HAG-FISH, sometimes brought up in the net off our coasts; it is from four to six inches long, and looks as if it had no head; its body is covered with minute pores, or holes, out of which, on pressure, comes a sticky kind of fluid. It often makes its way into the bodies of other fish, and, after devouring the inside, opens a door in the skin and crawls out, without paying for board and lodging. It has no eyes, and merely a kind of slit for a mouth; this is fringed with *cirri*, or hairs, like a beard. It is nearly related to the LAMPREY, feasting on which, you know, caused the death of King Henry I. This fish was formerly considered a great delicacy; those caught in the river Severn were most highly prized. *Petromyzon marinus*, meaning the Sea Stone-sucker, is the name of the Lamprey, which, to avoid being carried away by the current of the tidal rivers that it frequents, attaches itself to rocks and stones by the mouth. It sometimes grows to the length of three feet in warm climates; we seldom see it more than one foot long. The Romans ex-

pended large sums in rearing and fattening lampreys for their luxurious feasts. One of their emperors, named Lucullus, as Pliny tells us, had a fish-pond of such extent, that, at his death, its contents were sold for four million *sesterces*; the value of a sesterce was about seven farthings of our money, so my readers may calculate what this would amount to.

We have now to speak of the *bony* fishes, and as these are very numerous, only such of them as are frequently seen on our shores, and in our markets, can be mentioned.

Let us take first the family group called by naturalists *Gadidæ*, or COD-FISH. The common Cod is too well known, to need a description. We have all seen it, and partaken of its firm, sweet flesh; it frequently grows to a very large size. One, taken at Scarborough, in 1775, measured five feet eight inches in length, five feet in circumference, or round, and weighed seventy-eight pounds. We do not, however, commonly see the fish more than about three feet long. The Cod inhabits the waters of cold latitudes chiefly; the principal fisheries are on the coast (called the Bank) of Newfoundland, in the Bay of Canada, and in Davis's Strait, and along the coasts of Labra-

dor and Nova Scotia, all being in the great Northern Ocean. It is to the last-named stations that the British fishers chiefly resort; as many as twenty thousand being annually employed there, with from two to three hundred vessels, which are of the class called schooners. The fish are taken by means of lines, whose hooks are baited with the entrails, or flesh, of other fish, or of sea fowls. Nets are sometimes employed. From March to August is the season for the fishery; earlier than the former, or later than the latter month, it would be impossible to carry on the occupation on these ice-bound shores.

The French, the Americans, and the Dutch also enter largely into this profitable pursuit. It is to Newfoundland that the two former people chiefly go. The latter use what they call a *beug*, that is, a rope, half a league or more in length, which is kept from sinking by buoys placed at intervals, and the hooks attached to which are chiefly baited with lampreys; for a large supply of these they send over to England, where the rivers are well stored with them. Were it not for the enormous quantity annually taken and consumed, the Cod-fish would increase so as to fill the waters. A single ro

of a moderately sized fish, has been known to weigh two pounds ten ounces; and this, it is calculated, might contain 9,384,000 eggs—think of that, for the progeny of a single fish! How many eggs were there in that stout schooner, the Janet Hay, of which we read that she returned home lately, with a take of 30,000 fish? Much Cod, both fresh and salt, is consumed in this country, but far more in Catholic countries, where, on particular days, only fish may be eaten. The liver of this fish is full of oil, which, of late years, has come largely into use, as a remedy for certain diseases; and this, of course, has greatly increased the value of the fisheries. Fresh Cod is considered best for the table from October to Christmas. Like many other fish, they have bladders, by the compression or distension of which they are enabled to rise or sink in the water; these are called *sounds*, and are pickled, and sold separately.

The Latin name of the Cod is *Gadus morhua*; that of the Haddock, *Gadus æglefinus*; that of the Whiting, *Gadus merlangus*; that of the Ling, *Gadus molva*; that of the Hake, *Gadus merluccius*. These are all members of *the Cod*, or *Gadidæ* family, and common fish

with us ; they are gregarious—that is, go in shoals, sometimes so large as to cover many miles of the sea ; they have their annual migrations, for the purpose of *spawning*—that is, depositing their eggs, called spawn, in the rivers, or on sheltered parts of the coast ; they are accompanied by hosts of porpoises, dog-fish, and other enemies, which devour them by wholesale ; and the osprey, the fish-hawk, the cormorant, and the gull make great havoc amongst them : still on they move, directed by instinct to the spots best suited for their purpose, and turn not aside, though killed and caught by thousands and by millions.

We read of a shoal of Haddocks that extended, in breadth, three miles from the shore, and in length, *forty* miles ; and of three fishermen, near Scarborough, loading their boats twice a day with the fish, for some days, taking each time about a ton weight. It is the Haddock which is called St. Peter's fish, on account of having a black spot on each side of the back, made, it is said, by the forefinger and thumb of the Apostle, as he held the fish, to take from its mouth the tribute-money, which our Lord commanded him there to seek.

Of the vast quantities of Whiting annually consumed in this country alone, it is almost impossible to form a correct calculation; and Ling, again, is a fish of which a great deal is eaten here, in a dried state especially; as many as 900,000 pounds weight of this fish are sent over from Norway every year. The Hake is a coarser fish than either of the others; it is very plentiful on the coasts of Cornwall and Devonshire, and also on those of Scotland and Ireland, where it often goes by the name of Stock-fish.

That beautiful and much-esteemed fish the MACKEREL is placed by naturalists in the genus called *Scomberidæ*, and it is termed *Scomber scomber*, as much as to say this is *the* scomber, the head, or king of the tribe. Now *scombrus*, in Latin, means a dolt or a simpleton; but we know not why such a name should be applied to the Mackerel—one of the most elegant of fish in shape, most beautiful in silver and steely-blue tints, and most delicate in flavour. Like the fishes last described, Mackerel go in vast shoals. They visit chiefly the west and south-west shores of Britain, where their arrival is *eagerly* looked for by the fishermen, who go out

a mile or two from the shore, and stretch their nets, of great extent, across the tideway, so as to catch them coming in. A single boat has been known to take as many as fetched seventy pounds. Not long since there were caught in the west bay at Weymouth 300,000 of these fish in one day, and then about 50,000 escaped by the breaking of the net. In no warm latitudes have Mackerel ever been found, except just about the island of St. Helena, where they may be caught all the year round; they are extremely voracious fish, committing great havoc among the shoals of Herrings. They are considered to be in season for the table from March to June.

The TUNNY, called *Thynnus vulgaris*, is a near relative of the Mackerel, than which it is considerably larger. We do not see it on our shores, but it is plentiful in the Mediterranean, where a great number of persons are every year employed in its capture. The Tunny has a large and powerful tail, and striking this forcibly and rapidly against the water, it produces a sound which, when in large numbers, can be heard miles off; the Sardinian and Sicilian sailors, and others on the Italian coasts, when they hear this sound from afar, know

that the Tunnies are coming, and that they must plant their nets, which they do very gladly.

The SWORD-FISH, *Xiphias gladius*—the latter term being the Latin for a sword—as naturalists call it, bears some relationship to the Tunny. It receives its name from the long, pointed, horny snout which projects from the upper division of the head, and is a very formidable instrument, as well the whale knows, which is often killed by it; the two fish, it is said, never meeting without engaging in a combat. The Sword-fish is sometimes fifteen feet in length, and weighs 100 pounds; it is found swimming singly about the tropical seas, as well as the warmer parts of Europe. It is exceedingly irritable, and rushes at any offending object with all its force; in this way it has been known to bury its weapon wholly in the timber of a ship. Its flesh is said to be good eating, resembling veal.

The HERRING, like the Cod, is the typical fish of a genus; that is, the type or pattern which naturalists have agreed to take as their guide, in their arrangement of certain fishes into a family group, all the members of which are, when spoken of as a genus, called Herrings,

or, in scientific language, *Clupeinæ*, although they have other names besides to distinguish them individually: thus the common Herring is termed by them *Clupea harengus*. A truly beautiful fish is this, with a skin that gleams like silver, but so common, that few care to notice it; its bones are more numerous and slender than those of almost any other fish, and scarcely any die so quickly when taken out of the water; its teeth are exceedingly minute, from which it is supposed the animals on which it feeds must be so too. Immense numbers of shrimps, no bigger than fleas, have been found in its stomach, and the spawn or eggs of other inhabitants of the deep, many of which, in their turn, prey upon the Herrings that visit our shores every year in countless multitudes. Thus in 1773 the Herrings, for two months, were so numerous on the Scottish coasts, that 1650 boat-loads were taken in a single night; this would be about 20,000 barrels of the fish, when salted and dried. When done in this way, and smoked over a wood fire, they are called bloated, or red herrings, an article of diet of which enormous quantities are consumed in this and other countries. It has been computed that if a single pair of these fish were suffered

remain undisturbed for twenty years, they and their offspring would fill a space equal to ten times the size of the earth; but their enemies are so numerous, and incessant in their attacks, that the numbers are kept down, so as to be a blessing and a benefit to man.

The Herring shoals generally visit the British coast about the month of June; during the winter they remain in the northern seas, where, beneath the ice, they find a safe retreat from their numerous enemies. Their approach to the shore is known by a sound like the pattering of rain, or the ripple of a gentle current; faint at first and scarcely audible, it grows louder and louder, until it becomes like the rush of a heavy fall of waters, and lines and flashes of light go playing over the ocean in every direction, and as far as the eye can reach. On comes the innumerable host, stretching miles and miles away, the finer and heavier fish swimming at a considerable distance beneath the surface, and the younger and weaker ones gliding along the top, and presenting their silver scales to the sunshine. White-winged sea gulls hover about them, screaming with *delight* at the feast thus prepared. On the *skirts of the shoal*, and sometimes even in the

midst of them, spreading havoc and terror around, plunge the black-snouted porpoises, or the ravenous dog-fish, or it may be that a huge grampus, or monstrous bottle-nosed whale, follows in hot pursuit; one of these latter fish, said to have been about sixty feet long, pursued a shoal of herrings to the entrance of the Bay of Derby Haven, in the Isle of Man, a few years since, and the poor frightened fugitives actually leaped every now and then two feet out of the water by thousands, in their eagerness to escape. They got among shallows, where the monster could not approach them; and after throwing up from his blow-holes, with a noise like that of thunder, two jets of water to the height of forty feet, he made off again.

In a still, warm night, the approach of a shoal of Herrings may be heard at a great distance, and its progress known by a broad belt of phosphorescent light, which comes before the advancing line; and also by sparkles and gleams of the same, which play about the agitated waters. Vast numbers of people hail this sight with joy, especially about the western isles and coasts of Scotland, where the Herring fishery forms the chief means of support to the poorer inhabitants. They call this the king of

fishes, and well they may, for it gives them food, and the wherewithal to purchase clothes and other necessities; so let us never despise the Herring, small as it may be, and common as, like the sunshine and all the rest of God's best gifts, it is.

The PILCHARD, named *Clupea pilchardus*, is not generally so long as its near relative, the Herring. It has a body more round and thick, with a slightly elevated back, and is altogether more heavy and clumsy-looking. This fish, too, comes in vast shoals to the coasts of Britain, generally about the middle of July, remaining until October, and furnishing a profitable source of employment to thousands. It is on the coast of Cornwall that the Pilchard fishery is most productive; as many as 60,000 hogsheads having been taken there in one season, averaging each 3000 fish; here is another multiplication sum for our readers. The Pilchards are caught in a large net, called a *seine*, which is more than a quarter of a mile long, one end being leaded to make it sink to the bottom, and the other corked, to keep it floating. This is carried out in boats, and thrown so as to *enclose* the fish, which are brought to the *surface by means* of a smaller net, called the *tuck*

seine, and literally poured into the boats which carry them to the shore. The scenes on these occasions are described as among the most joyous and animated of any connected with the industrial occupations of man.

The SPRAT is but a little fish, yet it is one of considerable importance, on account of the numbers annually taken, and the sustenance and employment which it affords to many people. This, too, is a member of the Herring family, being the *Clupea sprattus* of naturalists. The shoals of Sprats resort much to our tidal rivers, especially the Thames, where they may be taken from the beginning of November until the end of March, not being, like the herring and pilchard, wholly or chiefly summer visitants, but, on the contrary, winter ones. Sprats are much eaten by the poorer classes of this country; they have been called "the weaver's beef of Colchester," a place in Essex, because, being brought there in great abundance, the weavers of the place make them their principal food. They are generally sold by the bushel, and are often so abundant as to be used by the farmers for manure; they are pickled and dried like herrings. The fish called the Sardine, caught about the island of Sardinia, and sent here

barrels, is a species of Sprat, if it be not, as some think, identical with our common sort.

The WHITEBAIT, called *Clupea alba*—the latter word being the Latin for white—is a beautiful little fish, of which large quantities are taken in the Thames from the beginning of April to the end of September. It is somewhat long and slender, of a silvery white colour; its flesh is most delicious, but it requires to be eaten near to the spot where it is taken, as it is too delicate to bear carriage; hence it is customary for the members of the Government, and other public bodies, to go annually to certain places on the banks of the Thames, for the purpose of eating Whitebait dinners. They were long supposed to be the young of the Shad, but they are now proved to be a distinct species.

In the *Pleuronectidæ*, or Flat-fish family, are several species well known to us. The habits of all are pretty much the same; they generally keep close to the bottom, and lie partly covered by the sand or soil, which in colour their upper surface closely resembles, so that they are not readily seen, either by their enemies or the small marine animals on which they feed. *The members of this family vary greatly in size.*

There is the huge HALIBUT, found chiefly on the coast of Norway, which sometimes weighs 500 pounds; it has been taken near own coast, seven feet six inches in length, and weighing 320 pounds.

There is the TURBOT, called *Pleuronectes*, or *Rhombus maximus*, whose ordinary weight ranges from five to ten pounds, although it sometimes reaches thirty pounds; and one was taken off Whitby, in Yorkshire, which weighed 196 pounds. The flesh of this fish is very firm, and of a delicate flavour, hence it is much esteemed as an article of diet. It is found in great abundance and perfection on the sand-banks between Dover and the French coast; there, and on those between the English and Dutch coasts, are the most valuable fishing-grounds, although it may be taken on nearly all the coasts of Britain. The fish are caught on lines, which extend sometimes three miles, and are furnished with as many as 2500 hooks, baited with a piece of herring or other fish. The lamprey appears to be the favourite bait; and at one time the Dutch were accustomed to purchase annually of the Thames fishermen as much as came to £700 of the lesser lamprey, for this purpose. The Turbot fishery is one of

great importance in Holland, as well as in this country; about 100,000 of the fish are sold in Billingsgate market every year, and these are chiefly for the supply of London alone.

The PLAICE (*Pleuronectes platessa*), the FLOUNDER (*P. flesus*), and the SOLE (*P. solea*) are all fish too well known to need a description. The latter is much the best fish for the table, being firm and well-flavoured; the two former are chiefly eaten by the poorer classes. All three live a considerable time after they are out of the water, and, consequently, keep good much longer than those which die quickly; they are sometimes taken very small, and sold by the dozen. There is a remarkable distinction between the family of Flat fish and the *Raidæ*, or Rays, to which the Skait belongs; the latter, it may be noticed, are flattened horizontally—that is, on a level with the ground—while the former are so vertically—that is, as if they had been stood up on edge, and pressed together between the two hands until they became flat; so that in the one family the mouth opens, as it were, along the edge, or a little below it, and in the other across it.

In the family termed Salmonidæ we have but one fish that can be called common, that is

the SALMON, one of the finest and most highly prized inhabitants of the waters. It sometimes measures as much as five feet in length; it is a very handsome fish, and in some seasons is very plentiful. Although an inhabitant of the seas during a part of the year, it is most usually taken in our large rivers, where it goes to deposit its spawn, frequently ascending many miles against the current, and even springing up the falls and cascades, with a strength and agility truly astonishing. Salmon most abounds in the Scottish rivers, and the greatest captures generally take place about the month of July, when more than 700 fish have been caught at a single haul of the net; from fifty to a hundred at once is a common take. Those which are not eaten fresh are pickled, or *kippered*, as it is called. At certain parts of the rivers which they ascend, nets are placed across, to take them; these are called salmon weirs. Those on the Scottish river Tweed extend fourteen miles from the mouth; they have let for as much as £10,000 per year, and to defray the expense, upwards of 200,000 fish must have been annually taken. As with all fish, the young of the Salmon are called *fry*. A *Salmon Peel* is one that weighs less than two pounds;

when over that weight, and not fully grown, it is called a *Grilse*. *Salmo salar* is the scientific name of this fish; *Salmo trutta*, or the Salmon Trout, is a different species of the same family, sometimes called the Bull Trout, or Sea Trout. This, too, is much esteemed as a table delicacy; its flesh is of a pinkish colour, like that of the common Salmon, which, in its habits, it closely resembles; it commonly weighs about three pounds. Of the true Trout, and other fresh-water fish, we cannot here speak; several of these belong to the *Salmonidæ* family, but, as they never visit the sea, they would be out of place in this book.

The STURGEON, called *Accipenser sturio*, is a fish by no means uncommon in some of our tidal rivers, which it annually ascends to deposit its spawn. It is curiously shaped, being long and slender, with a nose something like that of a greyhound, and a small mouth without any teeth; along the body run fine rows of bony lumps, or tubercles, as they are termed; the tail is *bifurcated*—that is, divided in two; the upper division being much larger than the under. This fish sometimes attains a larger size. One caught in the river Esk, in Scotland, some

years ago, weighed 460 pounds. The flesh is esteemed a great delicacy, and was so in the time of the ancient Romans. It is called a royal fish, and every one taken in the river Thames is presented to the Queen. In Russia, and other parts of the north of Europe, there are extensive Sturgeon fisheries; of the roe an article called *caviar* is prepared, and isinglass is the thick membrane forming the air-bladder. A naturalist, named Leiuwenhoek, states that the roe of one Sturgeon has as many as one hundred and fifty thousand millions of eggs; and another, named Catesby, says that a bushel of spawn may be taken from a single fish. How abundantly does God provide for the sustenance of man, and of all his creatures! That singular-looking animal the JOHN DORY is not unfrequently seen in the fishermen's baskets on the western shores of Britain; it is nearly as broad as it is long, with a profile very much like that of a hog, and bony fins, or rays, which have on the back long string-like terminations. Altogether, an odd fish this to look at; but epicures—that is, people who delight in good living—are very fond of its flesh. It is sent up from the Cornwall and Devonshire coasts, especially about Torbay, to the London

markets, and finds ready purchasers. When taken alive out of the water, this fish gives a kind of shriek, or whistle, which is produced by the air rushing through the gills. Naturalists call it the *Zeus faber*, and tell us that it has a near relative in the Indian seas, which they call *Zeus opah*, of a bright silver colour, a tail like a new moon, and rays that go streaming away on each side of it, and extend far beyond the tail, like the lines of an unfinished piece of network.

The RED and GREY GURNARDS are beautiful fish to look at in the water, on account of their bright colours, and the metallic lustre that plays about them, but their shape is very ugly; a large head, from which the body tapers off to a tail, cleft and formed much like that of the Sturgeon; the large pectoral fins project upwards a long way, and are armed with spines, as are the other fins; great staring eyes, that seem looking at nothing in particular. Such are the Gurnards, called by naturalists *Triglidæ*, being nearly related to the MULLET, which are sometimes seen gasping their lives out on the beach, or displaying their brilliant tints, mostly *red*, on the fishmonger's stall. The Mullet *group*, or family, is called *Mullidæ*; they are re-

markable for their small mouths and large eyes; the scales which, on the Gurnards are small and rough, on these fish are large and smooth; the shape, too, is more elegant.

Our readers will, no doubt, have noticed a fish of a serpent-like form, of a dusky colour above, and silvery white beneath, having its small fins edged with black, this is the Conger, or Sea Eel, belonging to a family called by naturalists *Murænæ*; it sometimes attains a very large size, weighing as much as sixty pounds, or even a hundred-weight, and is often a difficult fish to take, on account of its great muscular strength; it has been known to twine itself round the legs of the fisherman, and knock him down, before it could be secured. There is much that is interesting in the natural history of the Eels, but as those with which we are best acquainted are chiefly fresh-water fish, inhabiting the muddy bottoms of our rivers, an extended notice of them here would be out of place. They are all valuable as food, their flesh being sweet and nourishing, although many persons are prevented deriving the benefit which they might do from it, by the disgust excited in their minds by the snake-like form of the creatures. It is from He

that the London market is principally supplied with Eels; they are brought over alive, in vessels having capacious tanks, or wells, calculated to hold 15,000 or 20,000 lbs. weight.

Several other fish, some remarkable for their beauty, and some for their ugliness, might be mentioned as occasional visitants on our coasts, but they occur so rarely, that we need not trouble ourselves to speak of them here, our lessons being chiefly confined to *common* things of the sea-side: we will, therefore, bring our present chapter to a conclusion, although we have many other marine animals to describe, which properly belong to that branch of natural history called *ichthyology*, a Greek word signifying the science of fishes.

QUESTIONS.

- | | |
|--|--|
| What is Johnson's definition of a <i>fish</i> ? | How many fins do fish usually have? |
| What is the more correct definition? | What names are given to them? |
| What is a <i>vertebrate</i> animal? | Where are they situated? |
| What is the <i>vertebra</i> ? | What is the use of the fins? |
| What are <i>quadrupeds</i> ? | Of what do they consist? |
| What are <i>bipeds</i> ? | What is the difference between a <i>spinous</i> and a <i>flexible</i> fin? |
| What does the word <i>vertebra</i> come from? | What do you understand by <i>buoyant</i> ? |
| By what means do fishes breathe? | What is the word derived from? |
| How do the lungs act? | What is there particular about the scales? |
| What does <i>lamina</i> come from? | Does a fish move both jaws? |
| Can you describe the gills? | Which is usually the largest jaw? |
| What are the <i>auricle</i> and <i>ventricle</i> of the heart? | What are the teeth of fish called? |
| What is a <i>cold-blooded</i> animal? | What is the form of them? |
| What are fish sometimes called? | Are they numerous? |

What else is there particular about them?

How are the eyes of fish generally placed?

Can they see far?

What other senses do fishes exercise?

What is said of the *Tunnies*?

What other fish are known to utter sounds?

What character has been generally attributed to fish?

What is their true character?

What shall we do to fish, if we obey God?

What kind of fish die soonest when taken out of the water?

Why is this?

What is the *Whale* called in Scripture?

How many times is it mentioned, and where?

Are whales properly fish?

Why not?

What is the meaning of *oviparous*?

What of *viviparous*?

What do the two terms come from?

What do you understand by *mammalia*?

What does the term come from?

Where is the common whale chiefly found?

Which is the most valuable part of the whale?

Which is next in value?

Has the whale any teeth?

What is there remarkable about the mouth?

What is the whalebone sometimes called?

How many pieces have been taken from a single fish?

What is the scientific name of the Greenland Whale?

What of the Black Whale?

What do whales feed on?

Can they swim fast?

What is a *harpoon*?

Is whale-fishing dangerous?

Why?

What is the *Cachelot*?

What is the meaning of its latter name?

Has this whale any teeth?
Where?

What oil does this fish yield?

What other valuable article?

What is it called in Latin?

What is the Latin name of the *Dolphin*?

What is it sometimes called?

Is this a true fish?

How many teeth and fins has it?

What do the poets say of it?

What is the true colour of the skin?

What is the Latin name of the *Porpoise*?

What family does it belong to?

What does its name come from?

What is it often called?

What are the habits of porpoises?

Do the fishermen like them?

Why not?

What is their usual length?

What is the *Grampus* sometimes called?

What is its size?

What animal does it attack?

In what does the *Narval* differ from the rest of the *Cetacea*?

Describe the horn.

Has the narval another name?

What is its size?

On what account is it valuable?

What is its scientific name?

What does this mean?

Of what shape is the body?

What colour?

What else is there remarkable about it?

What order of fishes does the *Shark* belong to?

Why so called?

Where do sharks most abound?

What is their character?

Why are they called *carnivorous*?

Describe the teeth of a shark?

What is the scientific name of the genus?

What English words resemble it?

What Latin root do they come from?

What does *coriaceous* mean?

What *tuberculated*?

What is *shagreen*?

Describe the head of a shark?

What is the scientific name of the Great White Shark?

What do the French call it?

Why?

- What is the scientific name of the *Dog-fish*?
- To what does this name refer?
- Describe the dog-fish?
- What peculiar mode of defence has it?
- What other species of shark sometimes visits the British coast?
- Describe it.
- What are the egg-cases of some sharks called by the fishermen?
- What other fish deposit their eggs in similar cases?
- What is the scientific name of the *Skait*?
- Describe this fish.
- What opinion do some naturalists entertain with regard to the skait?
- What other fish closely resembles the skait?
- Describe the *Torpedo*.
- Describe the *Hag-fish*.
- What remarkable habit has it?
- What are *cirri*?
- What historical incident is connected with the *Lamprey*?
- What is its scientific name?
- What does the name imply?
- Why is it so called?
- What ancient people were fond of this fish?
- What is the scientific name of the *Cod-fish* family?
- What is the common length of this fish?
- Where is it chiefly found?
- How many persons are commonly employed in the British cod fisheries?
- What kind of vessels are employed?
- How are the fish caught?
- What is the fishing season?
- What people chiefly enter into this pursuit?
- How many eggs has it been calculated a single roe of the cod might contain?
- How many fish have been taken in a single vessel?
- What part of the fish is used for a medicinal purpose?
- When is cod in season?
- Of what use are the air-bladders?
- What are the *sounds*?
- What is the Latin name of the *Cod*?
- What of the *Haddock*?
- What of the *Whiting*?
- What of the *Ling*?
- What of the *Hake*?
- To what family do these all belong?
- What do you understand by *gregarious*?
- What by *spawning*?
- What are the chief enemies of these fish?
- How far has a shoal of haddocks been known to extend?
- What is the haddock sometimes called?
- On what account?
- What quantity of ling is said to be annually imported?
- From whence does it come?
- Where is the hake especially plentiful?
- What is it often called?
- To what genus does the haddock belong?
- What is its scientific name?
- What does *scombrus* mean?
- What are the habits of *Mackerel*?
- How are they caught?
- How many have been taken in one day?
- Are these fish found in warm latitudes?
- What is their character?
- What is the scientific name of the *Tunny*?
- Where is it chiefly found?
- What peculiar habit has this fish?
- What is the scientific name of the *Sword-fish*?
- What is the meaning of *gladius*?
- What large animal is frequently killed by this species?
- What are the habits of the sword-fish?
- What weight does it sometimes attain?
- By what scientific name is the *Herring* family distinguished?
- What is the name of the common herring?
- Describe the fish.
- On what is it known to feed?

What is said of the herrings in 1773?

What are bloated and red herrings?

What computation has been made of the productive powers of these fish?

Why do they not increase in that proportion?

When do the herring shoals visit us?

Where are they in the winter?

How is their approach known?

Describe the advance of the shoal.

By what enemies are they attended?

What is the effect by night?

What do the Scottish people call the herring?

Why?

What is the scientific name of the *Pilchard*?

Describe this fish.

When do the pilchard shoals visit our shores?

How long do they remain?

What part of the coast do they chiefly frequent?

How many have been taken there in one season?

How are pilchards caught?

What is the scientific name of the *Sprat*?

Where may sprats be taken, and when?

What have these fish been called?

Why?

What extensive use is sometimes made of these fish?

How are they preserved for use?

What kind of sprat is caught in the Mediterranean?

What is the scientific name of the *Whitebait*?

From what does the latter term come?

Where is it taken, and when?

What else is said of it?

What was it once supposed to be?

What is the scientific name of the *Flat-fish* family?

What are the habits of these fish?

On what do they feed?

What is the largest known Flat fish called?

What does it sometimes weigh?

What is the name of the *Turbot*?

What does it commonly weigh?

Name the weight of the largest taken on our own shores.

What is said of the flesh of this fish?

When is it fine and plentiful?

How is it caught?

What is the favourite bait?

How many turbot are sold in

London every year?

What is the scientific name of the *Plaice*?

What of the *Flounder*?

What of the *Sole*?

Which is the best table-fish of these?

Do they live long out of the water?

How are they sometimes taken and sold?

What is the distinction between the Flat fish and Rays?

What is the scientific name of the *Salmon* family?

How many species are common with us?

Describe this fish.

What are its habits?

Where do salmon most abound?

When is it most plentiful?

How many have been caught at once?

What is a common take?

What is pickled salmon called?

How are the salmon nets placed?

How far do they extend on the river Tweed?

What have they let for?

How many fish must be caught to pay this?

What are the young salmon called?

What are their names at different ages?

What is the scientific name of this fish?

What of the *Salmon Trout*?

What other name has it?

What does it commonly weigh?

What is the scientific name of the *Sturgeon*?

Describe the fish.

What is meant by *bifurcated* ?
 In what river was a large one
 caught, and what did it weigh ?
 What is said of the flesh ?
 What is the sturgeon called ?
 Where are the large sturgeon
 fisheries ?
 What is *caviar* ?
 What is *isenglass* ?
 How many eggs has it been stated
 a single roe of this fish might
 contain ?
 Describe the *John Dory* ?
 Where is it chiefly taken ?
 What peculiar habit has it ?
 What is its scientific name ?
 What is that of the species found
 in the Indian Ocean ?
 What is said of the *Gurnards* ?

Describe them.
 What do naturalists call them ?
 To what fish are they nearly re-
 lated ?
 What is the scientific name of this
 group ?
 For what are they remarkable ?
 In what do the *Mulletts* differ from
 the *Gurnards* ?
 To what family does the *Conger*
Eel belong ?
 What is said of this fish ?
 Why do many persons object to
 the flesh of eels ?
 From whence is the London mar-
 ket chiefly supplied with them ?
 In what way are they brought
 over ?
 What is *ichthyology* ?



SECTION V. *Crabs, Lobsters, and other Marine Animals.*

We now enter upon a description of a class of animal which naturalists call *Crustacea*, because they are *crustaceous*—that is, they have a crust, or hard covering; the term comes from the Latin *crusta*, which properly means a piece of ice. But all animals which have a hard coat, or covering, are not *crustaceous*, only those whose cases are divided into many portions, having numerous joints, which fitting loosely together, allow of a free movement in the inmates, or wearers, as they may be called; and of their growth to a certain extent. Those creatures which have shells composed of one, two, or more pieces, in which they live as in a kind of

house, are called *testaceous*, from the Latin *testa*, a shell; of these we shall have to speak presently. The covering of the crustacean is more like a suit of clothes, or armour, fitting not only to the body, but also to the limbs, as we see in the crab, the lobster, and the shrimp, as well as in the wood-louse, and several other small animals which are generally called insects, and considered as such by those unacquainted with their peculiarities of structure.

These *Crustaceæ* were included by the great naturalist Linnæus in his *apterous*, or wingless order of insects; but later naturalists have altered this arrangement, and placed them by themselves in a class, which has many divisions. One grand distinction between insects and the marine *crustacean*, is that the former breathe through lungs, and the latter through gills, the difference of which has been already explained; their different modes of life render this necessary. There are, it is true, aquatic or water insects, but these carry down with them the air necessary to their existence, as a diver draws in a long breath, and so inflates his lungs, before he descends; the reservoir of the water spider is a *little air bubble*, like a diving bell. Another *important difference* which may be noticed in

the economy of the *Crustaceæ*, is that, long after it has attained what may be considered its perfect shape, it continues to increase in bulk ; this the true insect never does, it undergoes great changes of form, and also of size ; but when once it has attained its highest stage of development it grows no more, but, after a short season, dies. Not so the crab and the lobster ; we see the members of one species of all sizes, and equally perfect in form, so that the largest might be taken for the smallest magnified. But how, it may be asked, about the clothes or armour of the crustacean ? Does this grow with the body, and so always fit to a nicety ? No ; it gives or stretches to a certain extent, and then has to be got rid of, and this is the most curious point in the history of the animal.

Every year, at a certain season, the shelly or horny covering becomes soft, so that by the swelling of the parts enclosed, the seams open, and the animal is enabled, after some effort, to cast it off, as one would an old garment. Away it goes—head-piece and body-mail, boots and armlets, even the jaws and hard cuticle, or skin, in which the teeth are set—away it all goes, and the poor naked animal is weak and

defenceless, but not for long; before the old shell was cast off, preparations had been making for the new one; a membrane had begun to form over the whole of the parts which the shell covered, and this, when exposed to the air, rapidly thickened and hardened, and at the same time, by the pressure of the parts within, expanding so as to form a case much larger than the one rejected. Naturalists have calculated that the annual increase in size is about one-fifth. After a certain time the crustacean attains its full growth, and then there is no more reproduction of its covering, unless it should happen to lose a claw or other limb, in which case there is a fresh growth from the stump of the old one. Frequently this renewed portion does not become so large as that which it replaces, so that crustaceans are often seen with disproportionate members; these we must look upon as cripples, which have had their limbs torn off in desperate encounters with other tyrants of the deep, for these are mostly fierce and voracious creatures, or in struggles to escape from the net or line of the fisherman.

No one who has looked into the shallow tide *pools*, or the ditches of the salt marshes, or the *holes* and water-channels of the sand on the

shore, can have failed to notice the little sidling CRABS, some no bigger than a sixpence, that, if one attempts to catch them, scurry away at a prodigious rate, and hide under some friendly stone, or bunch of sea-weed. *Cancer pagurus* is the name given by naturalists to the common edible—that is, eatable—Crab of our shores; it is the most familiar example of the *Cancer*, or Crab family, which has many members, differing greatly in appearance and habits. This species sometimes attains a very large size, weighing several pounds; it is found chiefly in deep waters, at some distance from the shore, and is captured by sinking buckets, or nets, baited with putrid flesh or other animal matter; into the mouth of these it crawls, tempted by the odour of the bait, and is unable to extricate itself. The small edible Crab called *Carcinus maenas* is the nimble little animal to which we have already alluded; it derives its first or generic name probably from the Latin for flesh, which is *carnus*. All the crabs are flesh-eating animals, and highly as they are prized as table delicacies, they are by no means nice in their feeding; they, as well as the lobsters and shrimps, are sometimes called Sea-scavengers. The French call this small species, which is as

common on their shores as it is on ours, *le Crâbe enragé*, the angry Crab, on account of its fighting desperately, and exhibiting its rage in a variety of grotesque motions and attitudes, when its capture is attempted; the larger kind they call *le Crâbe poupart*, or *tourteau*.

Pagurus is the generic name given to those which are called Hermit or Soldier Crabs. These, although armed with formidable claws, and clothed in mail like other members of the *Cancer* family, have the hind part of the body naked and defenceless; they therefore take possession of the shell of a whelk, or sea snail, and live in it until they outgrow their habitation, when they look out for another. They are called Hermits because they thus live in a cave; and Soldiers on account of their armour and their fighting propensities. They have two little hooks on the hind parts of their body, by which they fasten themselves to the inside of the shell of which they take possession, sometimes, it is said, after killing and eating the rightful owner.

Those who have watched the process of finding and taking possession of a new habitation by the *Soldier*, describe it as most amusing; sometimes two of these crabs will fight for a house.

and sometimes they have to wander about a long time with their unprotected bodies, before they can find one to let, and are then obliged to resort to many shifts and expedients for preservation from their many enemies. These *Paguri* are not often seen on our shores, but they are sometimes brought up in the fishermen's nets and dredges, and very grotesque they look, protruding from their borrowed or stolen houses.

Some of our native Crabs are really beautiful creatures, having a velvety down all over the *carapace*, as the case of the body is called, and even extending to the claws and legs—these are called Velvet Crabs; they belong to the genus *Portunidæ*, and are good swimmers, having the two hind pair of feet much flattened out at the sides, and the points spread into thin oval plates, which act on the water like oars. The constant up and down, see-saw motion, by which these instruments are kept going, to sustain the creature in the water, and urge it along, from its resemblance to that of a fiddler's elbow, has given occasion for the name Velvet Fiddler, by which the *Portunus puber*, the best known British species of this genus of Crabs, is sometimes distinguished. This is a very

striking and handsome crustacean, on account of the richness of its colours, among which are bright scarlet and azure, on a ground of silky brown, or drab.

Among the curious creatures sometimes brought up from the ocean depths in the dredge, is a small crustacean called the Strawberry Crab, being studded all over with pink tubercles on a white ground; naturalists call it, *Eurynome aspera*, and tell us that it is usually neither a swimmer nor a walker, but a climber, frequenting the tops of the submarine forests, and dwelling amid the branches, as squirrels do on land. Then there is the little Hairy Broad-claw, called *Porcellana platycheles*, which seems to form a connecting link between the crabs and lobsters, although it more resembles the former than the latter. This may be generally found in rocky crevices, and under broad stones, where it passes the greater part of its life; and its structure is well suited to such a mode of existence, being throughout flattened, as if it had been placed beneath a garden roller.

One can scarcely fail to be struck by the *similarity of shape* between the crabs and the *spiders*; there is the same roundish body, and

long sprawling legs, eight in number, fringed and jointed; true, the spiders have no claws, but they have, in place of them, long antennæ, or feelers, and there are Crabs on our coast which so closely resemble the web-weavers of the fields and gardens, that they are called the Spider Crabs: these are mostly inhabitants of deep waters, and good swimmers, extending their slender, bristle-like legs, and shooting along with great rapidity; the genera to which they belong are called *Stenorynchus* and *Inachus*. The tiniest of all this crustaceous family is the minute Pea Crab, called *Pinnotheres pisum*; these having soft and tender frames, generally take up their abode in what are called the mantle lobes, or, as we may say, the lining of the shells, of mussels, cockles, and other bivalves, the meaning of which term we shall explain presently.

Among the most remarkable members of the Crab family are the Land Crabs of tropical countries. They abound in the West India Islands, where they live in the mountains, coming down once a year to the shore, to deposit their eggs in the water; they form a procession two or three miles in length, and fifty paces broad; they are taken on these occasions

in vast numbers by the natives, who consider their flesh a great delicacy. There are several species of these Land Crabs, some of which inhabit dry woods, and are called Tree Crabs; others live in the mangrove swamps, and feed chiefly on the fruit which grows there, although nothing comes amiss to them. They burrow much in the earth, and the West Indian burial grounds are said to be pierced in every direction with the holes which they dig to get at the bodies.

It will thus be seen that the *Cancer* division of the great crustacean order includes a great many species, differing widely in size and shape. When first hatched, the young of the common Crab is very different from what we may call the perfect animal; it has a helmet-shaped head, which tapers off behind into a long, streaming, tail-like appendage; in front there are two great staring eyes; it moves through the water with great rapidity by means of a termination, something like a wisp of straw twisted up tightly. In the second stage of its existence, the lively creature somewhat resembles a lobster, and in the third, *becomes* a little nimble crawler, which every *year casts off* its suit of mail, only to put on a

larger, and if not devoured by some monster of the deep, perhaps of its own species, or taken by man, it eventually attains a large size and great strength, having a hard shell, that is very difficult to break, and a pair of nippers, almost as formidable as those of the LOBSTER, which is very common on our rocky coasts, especially about the Scilly Islands and the Land's End, Cornwall. But the grand Lobster fishery is on the coast of Norway; from whence it is computed about 1,000,000 are annually brought to this country. When Lobsters are in season, as many as 25,000 are sometimes sold in Billingsgate market, in London, on a single day. According to an act of parliament, they must not be offered for sale if they measure less than eight inches from the tip of the nose to the end of the middle fin of the tail.

What are called *Lobster pots*, or *creels*, which are used for catching these crustaceans, are made of osier rods, or basket-work; they are constructed on the same principle as the wire mousetraps, so that when sunk to the bottom of the sea by the weight of the stones attached to them, the Lobsters, which crawl in after the bait, cannot get out again; great numbers are

caught in this way, with their relatives, crabs, prawns, and shrimps, which, sharing in their fondness for raw flesh, share likewise in their captivity, and ultimate death. The Lobster is a very curious animal; a celebrated writer named Sturm, in his "Reflections on the Works of God," describes it as one whose flesh is in its tail and legs; and whose hair is in the inside of its breast; whose stomach is in its head, and which is changed every year for a new one; and which new one begins by consuming the old one. An animal which carries its eggs in its body till they become fruitful, and then carries them outwardly under its tail. An animal that can throw off its legs when they become troublesome, and can replace them with others; and lastly, an animal whose eyes are placed in long moving horns. So singular a creature will long remain a mystery to the human mind. It affords a new subject, however, to acknowledge and adore the power and wisdom of the Creator."

Such is the Lobster, called by naturalists *Astacus marinus*: a wonderful piece of mechanism, such as no human artist could possibly contrive or fashion. A strange creature, indeed, with its *cylindrical body*, defended by horny plates and

rings, and projecting spikes; its strong-jointed legs, long slender antennæ, broad tail divided into plates, and claws—such a pair! by which it is enabled to seize on its prey, defend itself against attacks from enemies, or fix itself to the rocks, so as to resist the action of the waves. As a crawler, the Lobster makes slow work of it; but it swims, or rather leaps in the water, with great rapidity. See now, he is preparing to spring; over he goes upon his smooth back, the plates of the tail are expanded like a fan—flap! it strikes the water, with a short sharp motion, and away the animal darts a distance of eighteen or twenty feet; but it is in a backward direction, and this is how the Lobster progresses, tail foremost, like the prawn and shrimp, and the river crayfish, or crawfish, which some naturalists place in the same genus, called *Astactus*. Great as is the destruction of Lobsters every year, yet they do not appear to diminish in numbers, on account of their being so extremely prolific—that is, producing such a vast number of eggs; no less than 12,444 have been counted under the tail of a single female.

It is only in warm weather that the Lobster comes into shallow water; during the winter it

remains in the ocean depths, where the changes of temperature are not felt. The Crayfish may be considered as the fresh-water Lobster; it is much smaller than its marine relative, but its general habits and structure are the same. Both these animals, when alive, are of a dark horn colour, but when boiled, they turn to a rich deep red; this is owing to the action of heat upon the colouring matter diffused over the inner side of the shell.

We will now speak of SHRIMPS and PRAWNS, both well-known members of the crustaceous family. *Crangon vulgaris* is the name given by naturalists to the former; *Palæmon serratus* to the latter. *Serrated* means jagged, or notched, like the teeth of a saw, and the term has reference to a sharp ridge, set with projecting teeth, which runs down the back of the Prawn, and, no doubt, constitutes its chief defence against enemies.

The *Crangonidæ*, as some naturalists term the Shrimps and Prawns, are all inhabitants of salt water, and are found chiefly on sandy bottoms, into which they burrow, hiding all but the head, in the very top of which are the *eyes*, which, for that reason, have been compared to garret windows, keeping a sharp look-

out for food. From this habit the fishermen call the common Shrimp the Sand-raiser. Our readers will scarcely require to be told that these creatures have no claws, or pincers, but long slender antennæ, of which, in most species, there are two pairs, the under ones being much longer and, generally, more curved than the upper. There are five pairs of walking, and five of swimming, or false legs; the former being long and much curved, and the latter short and fringed, or feathered, like the broad tail-fin. The Prawn differs but little from the Shrimp in structure; it is larger in size, and is distinguished by the serrated ridge along the back, and up the front of the head, before spoken of; it is chiefly found among the rocks where sea-weed is plentiful, and does not, like the Shrimp, often enter the mouths of rivers. The most common mode of taking these creatures is by means of what is called a Putting-net—that is, a broad net, fixed on a cross-piece, attached to a long pole, which forms the handle; sometimes they are caught in the lobster-pots, or creels. Many thousands of bushels are sent every week to London, from different parts of the coast, besides what are consumed in the country. One wonders where they all come from.

There are several species both of the Shrimps and Prawns common on our coast; some of them are beautifully marked with lines and dots; when swimming in the water they are almost as transparent as glass, and this, with their feathery fringes, slender limbs, and antennæ wreathed into the most graceful curves, give them a peculiarly light and elegant appearance. The scarlet-lined *Æsop* Prawn, so named because it has a hump on its back—as we are told the old Greek fable-writer had—is one of the most beautiful; its body, legs, head, and even the hair-like horns, have lines of vivid scarlet twining about them, which seem to change and shift with every motion of the creature, gliding in and out of the tangled seaweed, or darting backwards with the swiftness of light, with a sudden flap of its tail upon the water, after the manner of the lobsters, like which they change to a red colour when boiled.

We will now take a glance at the *Testaceous* order of animals—that is, those which inhabit shells; the term comes from the Latin *testa*, a shell. These may be either *univalves*, consisting of one piece, as the whelk, which is a kind of *sea-snail*; or *bivalves*, consisting of two pieces, as the oyster and the cockle; or *multivalves*,

having many joints, like the cuttle-fish. These terms have also Latin roots, being derived from *unus*, one; *bi*, two; *multus*, many. The inhabitants of shells belong to that division of natural history called *Mollusca*, the term being derived from the Latin *mollis*, soft; they have no bones, and, consequently, no internal skeleton; their forms, and even their structure, vary considerably in different species. Those which have univalve shells are called *gasteropods*, the term being a compound of two Greek words signifying foot and stomach, and having reference to the kind of fleshy foot which forms, in fact, the whole under side of the body, and, by its muscular contraction and extension, enables this creature to travel from place to place. The common snail affords a familiar example of this mode of progression, but this is scarcely a sea-side animal, so we will take the periwinkle, one of the best known of British molluscs; this is the *Turbo littoreus* of naturalists, belonging to that family of gasteropod molluscs called *Turbinidæ*, from the top-like shape of the shell, *turbo* being the Latin for top, and *littoralis* for belonging to the shore.

On all our coasts the pyramid-shaped *Trochi*, as the top-shells are called, are very plentiful;

great numbers may be picked up among the shingle and sea-weed, by any one who will take the trouble to look for them. Although all distinctly conical—that is, of a cone shape—yet they differ considerably in the several species, some being much flatter than others, and some, more wreathed, or twisted; some of them, too, are beautifully mottled, or marked, with spiral lines, or dots, raised above the surface, that go twining up the whorls like a string of beads. The Pearly Trochus, for instance, with whose long Latin name we need not trouble ourselves, looks as if its delicately tinted shell were ornamented with rubies, and the creature which inhabits this beautiful palace has a body as richly coloured, being of the tint of a ripe melon, striped with black. When next my readers hear the cry of “Periwinkles O!” let them think that the dingy mollusc which they pick out of its dull unornamented shell, and eat without compunction, has some near relatives that are richly clothed and sumptuously lodged; and even this little plain *Turbo* himself is altogether a wonderful piece of animal mechanism, as a microscopic examination of the tongue alone *would convince us*; it is with this that he mows down, as with a scythe, the minute vegetable

growth called *Conferva*, on which he principally feeds. This instrument, which, when not in use, lies coiled up like a watch-spring in a cavity of the stomach, looks to the naked eye like a slender white thread, about two inches in length; but it is in reality a delicate ribbon of transparent cartilage, thickly set with sharp hooked teeth, as clear and brilliant as glass; the hooks all turn one way, and when the creature passes the instrument over his miniature grazing-ground, it cuts down the tender herbage and draws it into the open mouth at the same time, being a kind of portable reaping machine, with sickle and rake all in one. All the gasteropod molluscs have an instrument of this sort, but the variations in form and mode of action are infinite. There are many other univalves, beside the *Trochi*, common on our shores; some, like the Land Snail, being nearly globular—that is, globe-like in form, with just a few spiral turns at the sides, and only a slight projection; others are nearly flat, having the whorls, as the turned portions are called, but little raised; others, again, taper out into a long spire, like that of the village church; some are deeply indented, like the steps of a spiral staircase, and smoothly

ribbed, or roughly ridged, as the case may be. Indeed, the variety in shape is endless, and the size, too, varies greatly, from the little ash or flesh coloured Pig Cowrey, no bigger than a pea, to the Great Whelk, *Buccinum undatum*, so called because the shell, frequently four inches in length, is marked with undulations, or water-like lines. The fishermen call this common mollusc the Conch, or the Buckie; the scarcely less plentiful Dog or Stone Whelk, *Buccinum lapillus*—from the Latin *lapis*, a stone—they term the Yellow Bandy, on account of the spiral lines of yellow which enwreath the shell. We read in Scripture of Tyrian purple, a rich dye, of which the merchants of Tyre made great profit; this, it has been clearly ascertained, was the produce of several kinds of shell-fish, and the Whelk which is found among rocks at low water is believed to have been one of those which afforded it. We have also the Netted Whelk, whose shell is marked all over with lines; hence it is called *B. reticulatum*, that being the Latin for netted. They are very destructive creatures these Whelks, drilling, with their spiny tongues, holes through the thickest shells, and then sucking out the inhabitant.

Of the molluscs which inhabit bivalve shells

there are many kinds very common on our shores, and none more so than the OYSTER, which belongs to a class of animals called *Conchifera*, or *testaceous acephela*—that is, headless testaceans, these creatures having no perceptible head; some of them live for a long time buried to a considerable depth in the sand, or mud, at the bottom of the sea; others form hollow chambers in the rock, into which they have the power of burrowing, by some process which has not been clearly understood; others anchor themselves, as it were, to rocks, or the stems of sea-weed, by means of a hair-like appendage, which naturalists call the *byssus*, and common folks, the beard. The shells of all this class of animals consist of two pieces, forming pairs, united at one part of the edge by a kind of hinge, which is very tough and elastic; they can be opened or closed, at the pleasure of the inhabitant, by means of a set of powerful muscles; generally, during the life of the creature within, they remain open a little way, to allow the water to flow in, from which the food is obtained, in the shape of animalculæ, so small as to be invisible to the naked eye; so they have but to lie quiet and leave their doors open, and they are sure to have

enough, and to spare, brought to them, without the trouble of seeking for it. Happy testaceans! But is man therefore unhappy, because he has to earn his food before he can eat it? Nay; God, in his infinite wisdom, has seen fit to order it thus; the very exercise of those powers which procure him the means of existence, is a source of health and pleasure. Were man condemned to be as idle as an oyster, which never leaves the spot to which it fixes itself, after floating about for a week or two, in the shape of spawn, or "sput," as it is called, in which state it resembles a little drop of greenish tallow, he would be perfectly miserable, and soon die of grief and disease. Every animal has its peculiar enjoyments, and, no doubt, this life of inaction is to the Oyster one of happiness. Man has reasoning faculties and an immortal soul, which raise him far above any of the inferior creatures; for these high privileges let us be thankful, and never wish ourselves other than what we are, for the sake of living what may seem to be a happy, because an idle life.

What a rough and rugged-looking affair is the house of the *Ostrea edulis*, as naturalists call the edible, or eatable Oyster, yet within it is beautifully smooth and shining, having a

lining of what is called *nacre*, or mother-of-pearl, a substance much used for ornamental purposes; this forms the interior layer of many shells, and sometimes the exterior also, as in the Pearly Nautilus, of which we shall speak presently, and the Pearly Trochus, already described. But this is not the true pearl, that jewel of great price, which, as my readers are doubtless aware, is frequently found in the shell of the Oyster, and which is said to be the result of disease, or of the introduction of some extraneous—that is, foreign—substance into the shell; this annoying the soft-bodied mollusc, it surrounds the intruding substance, perhaps a mere speck in size, with this beautifully smooth and lustrous deposit, which it has the power of secreting from the juices of its own body; layer upon layer it goes on, until it has formed a perfectly smooth round, or oval lump, which presenting no angles, causes no further inconvenience to the Oyster, and thus this little mollusc, working down on his slimy bed, prepares jewels which are considered fitting ornaments for a royal crown.

The principal pearl fishery in the world, is on the north-west coast of the island of Ceylon, in the Indian Ocean; for the exclusive right of

fishing on the banks of that island, for one year, as much as £120,000 has been paid. The particular species of Oyster there found is called *Margaritefera*, or the Pearl Oyster, from the Latin *margarita*, a pearl. It is brought up from the bottom by expert divers, who are trained to it from infancy. The fishing period extends over a month or so; about 200 boats are generally employed in it, and one boat has been known to bring on shore, in a single day, as many as 33,000 fish. The value of pearls depends much upon colour and size; those which are perfectly white fetch the highest price; next, those which have a yellowish tinge, provided it be clear, and of the same tint throughout. A single Oyster will sometimes contain several pearls, and we read of one which had no less than 150: this was a wealthy mollusc! Seed-pearls—that is, the smallest kind—are used for many ornamental purposes; and of the refuse pearly matter a kind of confection is prepared, called *chunam*, much used by the Chinese. Pearls are mentioned in Scripture as things of great value; our readers should find out the passages which refer to them. They were held in high estimation by the ancient Greeks and Romans, the latter of whom obtained many

from this country, where some very costly ones have been found, although, generally, the British pearls are small, and want purity of colour.

Perhaps in no country are oysters eaten to so great an extent as in England; the numbers annually consumed must be prodigious: as many as 15,000 bushels are every year sent to London from Essex alone. The price at which they are sold at Billingsgate market varies from 8s. to 40s. per bushel, according to their quality, those from certain places fetching a much higher price than others. The Oyster season commences in August or September, and ends in April; therefore they are said to be in season in every month which has the letter *r* in its name. They are taken, by means of dredges, from certain fishing-grounds called Oyster-beds, generally in sheltered bays, or in tidal rivers: no persons, except those duly licensed by the Oyster companies, are allowed to fish there, and these may take only so many bushels at a time.

Man is, of course, the Oyster's greatest enemy, but he has others which help to thin his numbers; not to speak of the Crab, that drills a hole clean through the shell, and sucks him out piecemeal, and the Great Whelk, which

does much the same, there are the Star-fishes, or Five-fingers, as the fishermen call them, that congregate so thickly about the Oyster-beds, that the dredges come up filled with them time after time, and they are sold by waggon-loads to the farmers, for manure. Our readers may wonder how a creature so soft and brittle, as that appears to be, can injure the well-defended testacean. Well, this is how it goes to work, seating itself upon the Oyster, it extend its rays, which we may call arms, over it on every side, so as to cut off the supply of food from the mollusc, which, after awhile, becomes so weak as to be unable to exert the muscular power necessary for keeping the shell closed; as soon as this begins to gape, the star-fish inserts its rays, which are covered with innumerable suckers, and now the poor Oyster's fate is sealed; he is speedily drawn out of his shell, and swallowed bodily, without either pepper or vinegar. The Oyster, too, has other enemies, but none so destructive as this.

The Mussel, called *Mytilus edulis*—that is, the eatable Mussel, and the Cockle, *Cardium edule*, from the Latin *cardium*, a heart, that being somewhat the shape of the shell, are both well-known bivalves; the latter has that silky ap-

pendage called the *byssus*, before spoken of, which is, however, more fully developed in the *Pinna*, or Marine Mussel, which is found most commonly in deep water, moored to something stedfast, by means of its silky cable.

No one, to look at it, would think the common Cockle adapted for an active life, or that it could move about very nimbly, yet this Cephalopod, although it has no head, has a strong muscular foot, which it stretches out to the utmost, then bending and fixing it firmly against the rock, or sand over which it is progressing, it gives a sudden spring, and immediately repeating the process, manages to get along at a very good pace. This foot, which may be elongated almost to a point, is also used as a spade; and it is wonderful how quickly its owner can dig with it a hole in the sand, and disappear altogether from view. The Cockles, too, can dance; a number of them which were put into a basin with some salt water, and set aside to be cooked in the morning, betook themselves to this amusement in the night, and made such a clatter with their shells, as to alarm all the household.

A very common shell on some parts of our coast is that of the large Scallop, called *Pecten*

maximus, the first word being the Latin for a comb, and the last for great. The deeply indented edges of these shells give occasion for the name applied to the whole family, *Pectinidæ*; they are what naturalists would call *pectinated*; that is, toothed like a comb. The Scallop-shell was used of old as the pilgrim's badge, and was commonly worn in the hats of those who went to the Holy Land, or Palestine. An examination of a pair of these shells will show that one is flat, or nearly so, and the other concave, or hollow; they sometimes attain a large size, and, before plates and dishes of earthenware became cheap and plentiful, were often used to serve up food in, and also for drinking vessels. The common Scallop is sometimes called the St. James's Cockle. Several other species of this family are common to the British shores; they are prettily marked, but are not so beautiful as many of the foreign kinds, some of which are nearly as transparent as glass, and so richly variegated, that the French naturalist Cuvier called them the "Butterflies of the ocean."

Among the commonest shells of our shores are the LIMPETS, called in Latin *Patella*, the term signifying a salad dish, or knee-pan; these creatures attach themselves so firmly to rocks,

by means of their fibrous foot, that they can only be removed by inserting a knife-blade, or some other flat substance, under them, and then using considerable force. On Limpets and Periwinkles the people of the Scottish isles chiefly depend for food, in seasons of scarcity. Of the former there are several species; some, which are called Key-hole Limpets, have an aperture on the top of the shell, which is situated exactly over the breathing organs, and serves as a channel for the water required for respiration. Naturalists have placed these in a separate genus, which they term *Fissurellidæ*, from fissure, a cleft or slit. There is a tiny shell, prettily marked with blue streaks, on an olive ground, which is frequently found attached to the stems of the larger sea-weeds; this is the Pellucid Limpet, so called from the clearness of the shell, pellucid signifying clear. The common Limpet-shells are shaped something like a pyramid, or deep cup; they are often thick, and difficult to break.

The Rock-borers, or *Pholades*, from the Greek *phalos*, to hide, have a singular power of piercing holes in the solid rock, where, like the Edomites of Scripture, they make their habitations; they have shells as thin as paper, and

brittle as glass, and the wonder is how they are able to scoop out those rocky chambers in which they dwell. The fishermen call them Stone-piercers, Prickly Piddocks, or Pick-stones, and use them extensively as bait; they are also, like nearly all the native bivalves, taken as food. These are not the only molluscs which pierce their way into stone; some of those belonging to the genus *Mya*, or Gapers, and a kind of Cockle, called the Rock-boring Venus, can do it. These creatures, like those of the *Solanæ*, or Razor shells, frequently found on the beach, inhabit chiefly sandy or muddy bottoms, in which they bury themselves, leaving only a slight depression, out of which they every now and then discharge a little jet of mingled sand and water, to keep a passage open for breathing and feeding.

Then, too, there is the well-known Ship-worm, *Teredo navalis*, that drills holes in the hardest wood, and has caused the destruction of many a ship. This is a soft-bodied animal, being one of the *Annelides*, or Sea-worms, about which much might be said, were our book a larger one. Properly speaking, the *Pholades* are *multivalves*, as their shells are in several pieces, like those of the *Chitonidæ*, so called from the

Greek for a coat of mail ; these molluscs being covered with shells formed of several distinct pieces, which overlap each other like the plates of a suit of armour. They are very different from the conical shell of the LIMPET, or the deeply carved covering of the ROCK-BORER. The CHITONS, with us, are small, and by no means numerous, only two or three species having been met with here ; the prettiest, and perhaps the commonest, is the Tufted Chiton, *C. fascicularis*, from the Latin *fasciculus*, a little bundle of leaves or flowers ; this may not unfrequently be found adhering to stones at low-water mark.

Sometimes a piece of timber which has been for a time submerged, or kept under water, when brought on shore, will be covered with long, snake-like stalks, of a purplish colour, terminated by a kind of helmet, composed of five pieces of pearly shell, somewhat loosely fitted together, out of which protrude bunches of feathery-looking *cirrh*i, or *tentacles*, the former term coming from the Latin *cirrus*, a tuft of hair, and *tentus*, a hook ; it is with these that the creatures called *Barnacles* catch and hold their prey. A naturalist would tell you that this curious animal belongs

to the class of molluscs called *Cirrhopoda*—that is, hairy-footed; it is the Goose Barnacle, or Bernacle, of the ancients, who believed that, after passing through certain stages of growth, it changed into an aquatic bird, known as the Barnacle Goose; hence the name *Anatafera* given to this particular species, from the Latin *anas*, a goose. But we are not such geese as to believe this strange fable, although the Barnacle does undergo a transformation almost as great and wonderful as this. It was once a lively little creature, about the tenth of an inch long, with six thin-jointed legs, thickly set with hairs; two long arms, each furnished with hooks and a sucker; and a tail tipped with bristles, which was usually folded up under the body; then it had a pair of large staring eyes, set upon footstalks, and therefore called *pedunculated*, and a little shelly house on its back, into which it could gather up its scattered members, when it was tired of skipping about like a water flea; afterwards it settles down in life, and becomes the staid and respectable helmeted snake above described.

The Barnacles are of two kinds, *stalked* and *sessile*—that is, seated closely upon the object of attachment, which may be a piece of fixed

or floating timber, a ship's bottom, or the body of a whale, or other marine substance; once fixed, they remain so for life, and take their chance of a sufficient supply of food from the ever-moving waters.

We now come to the Cuttle-fish tribe, which belongs to the class of animals called *Cephalopoda*, from *cephal*, head, and *poda*, foot, they having the feet, or organs of motion, arranged round the head, or the body, if you choose to call it so, which is a kind of bag, with a mouth at one end, surrounded by a number of long snake-like arms; these, on the common Cuttle-fish, frequently met with on our shores, are eight in number, hence the scientific name *Octopus vulgaris*, from *octo*, eight: the last of the Latin words means common. This creature, which is frequently called the Poulpe, or Preke, is as hideous a monster to look at as can well be conceived; it has great, round, staring eyes, and horny lips, which lengthen out into a kind of beak; the head and body, all in one, is shaped like an inflated bladder, and all around it twist and twirl these eight snaky legs, or arms, which are armed with rows of suckers, no less than 240 on each flexible limb, and so *tightly do these fix to any object to which they*

are applied, that it is almost impossible to loosen them without cutting: hence, when the *Octopus* seizes on a fish, it is useless for the poor animal to swim for its life, the foe, firmly fixed on its back, brings his horny mandibles, or jaws, into play, and eats as it rides. In tropical seas, the *Octopidæ*, as they are sometimes called, attain a very large size, and are really formidable animals; they have been known to drag a boat under water, and seize on the sailors.

In the Indian seas, the natives who pass from isle to isle in their canoes, always, it is said, carry an axe, wherewith to cut off the limbs of this creature, should it attack them. It has been seen there with arms nine fathoms long; with us it does not attain so large a size as to be at all dangerous. The Cuttle-fish, although so well armed in front, is quite undefended in the rear of its soft, naked body; but, to baffle its foes in this direction, it has the power of ejecting, or throwing out an inky kind of fluid, under cover of which it can escape; this is called *sepia*, and is much used by painters as a neutral tint. Some species of these Cephalopods are called *Sepeidæ*; in this group are included the common *Sepiola* (*Sepia vulgaris*) and the officinal Cuttle-fish (*Sepia officinalis*), they are

both met with in Britain ; they differ considerably in shape from the *Octopus*, and also from each other, but all have the same snaky limbs, and bladder-like body, from which is obtained the light, spongy kind of bone sold by stationers under the name of *pounce*, and used to take ink-marks out of paper or parchment ; this bone, forming as it does the rudimentary, or first stage of an interior skeleton, brings these Cephalopods into closer connection with the vertebrated animals, forming a sort of link between them and the molluscs, which are altogether boneless. The whole internal arrangement of the *Sepiola*, tends towards a higher state of organization ; thus the brain is lodged in a hollow skull, the nerves may be plainly traced, there is a well-formed ear, and eyes of a more perfect structure ; so that, ugly as he looks, there may be no lack of intelligence in our snaky-limbed friend, whose eggs may have been observed, by some readers of this book, in the shape of a number of dark-coloured, spindle-shaped bags, hanging in clusters by their fleshy stalks to sea-weed, or other floating objects : the fishermen call them Sea-grapes. Out of these, in due season, issue the young Cuttle-fishes.

One of the most beautiful of all shells is that of the Argonaut, or Paper Nautilus, an animal not unlike the common Cuttle-fish, as far as internal structure is concerned, although very different in outward appearance, being lodged in a pearly palace, such as we see and admire in most cabinets, and on many side-boards and mantel-pieces. The Pearly or Chambered Nautilus is another species of the same family, with an outward covering equally beautiful, if not more so. These two are testaceous Cephalopods, but they are only found in the seas of warm climates, from whence the most richly tinted and curiously shaped shells are brought. And what lovely and altogether wonderful objects are shells! How exquisitely wrought and fashioned to suit the various creatures for whose habitation they were intended. What infinite variety is there in the shape of them; what extreme nicety in the adjustment of their several parts; and yet how apparently simple the processes of growth and formation. Did space permit, we would gladly enter fully into this branch of our subject; as it is, we must refer such of our readers as may desire to know more *about* "Shells, and their Inhabitants," to a *volume* so entitled, which forms one of "The

Young Naturalist's Library,"* a series now in course of publication.

Many other creatures, strange and wonderful, might we speak of as common to the sea-shore, but to describe them all would far exceed the limits of this little book. We will just allude to a few of them, before concluding the present chapter. There are the STAR-FISHES, called *Asteriadae* (from *aster*, a star), of which several species are known as British; the commonest is called by the fishermen Five-fingered Jack, because it has generally five rays or points.

Uraster rubens is its scientific name. It moves, and seizes its prey by means of little fleshy suckers, put forth from numerous orifices on the under side of its rays; as many as 300 of these have been counted on one ray. Scarcely less common than this is its near relative the Sun-star, *Solaster papposa*, which has fourteen to fifteen rays, beautifully fringed and ornamented with little tufts of spines; the colours of this are bright and variegated, and the shape perfectly symmetrical.

There are other species of a more obtuse, that is, blunt form, with less indentations; and some called the BRITTLE STARS, which have

* Messrs. Groombridge & Sons, price 1s. per volume.

small circular bodies, from which issue five or more slender lines, in some cases fringed like a feather; these twist and wriggle about like water-snakes. The animals are called brittle, on account of the strange facility they have for falling to pieces when touched, or in any way alarmed. *Ophiurida* is the name given to this division of the family by Professor Forbes, who has written a history of British star-fishes.

Then there are the SEA URCHINS, or HEDGE-HOGS, also belonging to the Asteriadæ group, although very different in appearance. Naturalists call these *Echinidæ*. The commonest on our shores is the Egg Urchin, *Echinus sphaera*, which may be translated the Prickly Globe, or Sphere, a name which sufficiently describes its appearance. It may seem strange that these should be classed with Star-fishes, but there are certain similarities of structure which render such a classification natural and proper.

JELLY-FISHES are among the most extraordinary of the animated wonders of the sea; floating about apparently without aim or power of guidance, they resemble a lump of transparent jelly, or a mere bladder filled with water, and yet they have a peculiar organization, and differences of structure sufficient to distinguish

one species from another, and, no doubt, their particular modes of enjoyment. Some of these Jelly-fishes, called by naturalists *Acalephæ*, are extremely beautiful, displaying in the sunshine all sorts of brilliant colours. In tropical seas they are very large and numerous, and produce that pale gleaming light termed *phosphorescent*, because it resembles that caused by a substance called phosphorus, of which lucifer matches are made.

Mariners tell us that at times it appears as if the ship were sailing through molten—that is, melted—silver; she leaves behind her, as she goes, a long track of quivering light; and if the water be disturbed by an oar, or aught else, it gives out flashes and sparkles, that shift, and change, and play about the object of disturbance, in a manner wonderful to behold; the sea is then called *luminous*, which is the Latin for light. This may be sometimes observed, in a fainter degree, on our own shores, and it is thought to be owing to the presence of immense numbers of these Jelly-fish, or *Medusæ*, as they are sometimes termed. Some of these are quite *microscopic*, that is, so small as to require a microscope to distinguish them individually. The larger kinds are sometimes called SEA

NETTLES, because they have the power of stinging. Many a bather has been suddenly startled by a tingling sensation, for which he knew not how to account; it was caused by one of these Sea Nettles, which occasionally measure as much as two feet across, and weigh several pounds when taken out of the water; they, however, soon shrivel up, and become like pieces of dry skin.

One very curious point in the history of these strange creatures is, that their young are produced in the form of small *gemma*, or buds, so that they would seem to form a link between the animal and vegetable world. They are certainly very low in the scale of animal organization, although not so low perhaps as the *Polypes*, those minute sea-worms which inhabit the horny and stony cases known as Corals and Sponges. Properly, these structures are *Poly-pidoms*; that is, the homes of the *Polypes*. These habitations assume a great variety of forms, from the wide-spreading and firm coral reef, which forms the basis for large islands, barriers against the roaring waves, to the delicate *Flustra foliacea*, which may frequently be picked up on the shore; it is as thin as paper, of a dirty white colour, and if examined by a

microscope, will be found to consist of innumerable little oblong cells, placed back to back, like those of a honeycomb. In these cells, as in the minute cavities which roughen the surface of the beautifully branched coral brought from foreign parts, once dwelt tiny worms, which secreted the lime whereof these houses were composed, and lived and died, each generation building and inhabiting fresh cells, of which they themselves were the architects.

Thus it was, by the aid of millions of workers, that the great coral reefs grew and grew, from century to century, and are still growing, and in many places materially altering the surface of the globe, making dry land where once was nothing but water, and crowning with fresh and verdant beauty the wide ocean solitudes; and all this the work of a little creature, that you can hardly see with the naked eye.

See what *perseverance* and *combination* can effect. Work well and work together, and you will do wonders; but you must strive after that which is right, and pray for God's blessing on your labours.

QUESTIONS.

What are *crustaceous* animals?
What does the term come from?
What is the covering of the crustaceans like?

What is the great distinction between insects and the marine crustaceans?
What does the water-spider

- What is remarkable in the economy of the crustaceans?
 How do the crab and the lobster change their covering?
 What is calculated to be the annual increase in size of these animals?
 What happens when a limb is lost?
 What is the scientific name of the common *Crab*?
 What is the meaning of *edible*?
 What is the name of the smaller species?
 From what Latin root does it come?
 What do the French call the small crab, and why?
 What do they call the larger?
 What is the generic name of the *Hermit Crabs*?
 What are their habits?
 What is the body covering of the crab called?
 To what genus do the *Velvet Crabs* belong?
 Why is one of them called the *Fiddler*?
 What is the Latin name of this species?
 Describe the *Strawberry Crab*?
 Give its Latin name.
 What other crab is mentioned?
 What is its scientific name?
 What are its habits?
 To what genera do the *Spider Crabs* belong?
 Describe them.
 Which is the smallest of the crab family?
 What is its Latin name?
 What is remarkable of the land crabs?
 What is a young crab like?
 On what part of our coast is the lobster most plentiful?
 Where is the great lobster fishery?
 How many are sold at Billingsgate in a single day?
 Describe a lobster-pot, or creel.
 How does Sturm describe the lobster?
 What is its scientific name?
 How does it progress in the water?
 What fresh-water animal does the same?
- In what genus are they both placed?
 How many eggs have been counted in the tail of a small lobster?
 Where does the lobster remain during the winter?
 What is its colour before boiling?
 What after?
 What is the name of the common *Shrimp*?
 What of the *Prawn*?
 What is the generic name given to them by some naturalists?
 What are their habits?
 Describe a shrimp.
 In what does the prawn differ from this?
 How are they commonly taken?
 Why is the *Æsop prawn* so named?
 Describe it.
 What are *testaceous* animals?
 What does the term come from?
 What are *Univalves*?
 What *Bivalves*?
 What *Multivalves*?
 What are the Latin roots of these terms?
 What do you understand by *mollusca*?
 Give the root of the word.
 Describe a mollusc.
 Which are the *Gasteropods*?
 What is the origin of the name?
 What is the *Turbo littoreus*?
 To what family does it belong?
 Why so called?
 From what Latin roots does the term come?
 What is the scientific name of the *Top Shells*?
 In what respects do they differ from each other?
 What is said of the *Pearly Trochus*?
 Describe the tongue of the *Periwinkle*.
 What else is here said of the top-shells?
 What is the Latin name of the *Great Whelk*?
 What is it sometimes called, and why?
 What is the ancient name of the dye which it is said to produce?

- Whereabout in Scripture is this dye referred to?
 What other whelk have we?
 What is its Latin name?
 What does *reticulation* mean?
 What else is said of the whelks?
 To what class of animals does the *Oyster* belong?
 What is it?
 What does this mean?
 What are the habits of these testaceans?
 What is a *byssus*?
 Of what do the shells consist?
 On what do they feed?
 What is the young of the oyster called?
 What kind of a life does the oyster lead?
 What is its scientific name?
 With what is the shell lined?
 What other animals have pearly shells?
 How are pearls formed?
 Where is the principal pearl fishery?
 How much has been given for the right of fishing there for one year?
 What is the Latin name of the *Pearl Oyster*?
 From what root does it come?
 How are pearls obtained?
 How many boats are employed in the fishery?
 How many fish has a single boat been known to bring on shore in one day?
 On what does the value of pearls depend?
 How many pearls has one oyster been known to contain?
 What are seed pearls?
 What use is made of the refuse?
 Where are the Scripture references to pearls?
 By what ancient people were pearls much esteemed?
 What is said of British pearls?
 How many bushels of oysters are yearly sent to London from *Essex*?
 At what price are the different kinds sold per bushel?
 When does the oyster season begin and end?
- What is the popular saying about it?
 How are oysters taken?
 In what situations?
 May any persons take them?
 What are the oyster's greatest enemies?
 How does the star-fish destroy it?
 What is the Latin name of the *Mussel*?
 What of the *Cockle*?
 What does *cardium* mean?
 What is the *Pinna*?
 Where is this mollusc found?
 What are the habits of the cockle?
 What is the Latin name of the *Large Scallop*?
 What does this mean?
 What name is applied to the family?
 What is it to be *pectinated*?
 To what use was the scallop-shell applied of old?
 What is the common scallop sometimes called?
 What did Cuvier call the scallops?
 What is the Latin name of the *Limpet*?
 What is meant by *patella*?
 What are the habits of limpets?
 What people feed much upon them?
 What are the *Key-hole Limpets* called in Latin?
 From what is the term derived?
 Why are they so called?
 What is the smallest of our limpets termed?
 Why called pellucid?
 What is the shape of the limpet-shell?
 What is the scientific name of the *Rock-borers*?
 From what is it derived?
 To what people mentioned in Scripture are they likened?
 What is said of their shells?
 What do the fishermen call them?
 For what do they use them?
 What other molluscs make their way into stones?
 What are the *Solane*?
 What are their habits?
 What is the Latin name of the *Ship-worm*?
 What mischief does it do?

To what class does it belong ?
 What are the *Pholades* properly ?
 Why are the *Chitonidae* so called ?
 What is remarked of the *Chitons* ?
 Which is the commonest species with us ?
 What is its Latin name ?
 What does it come from ?
 What is the origin of the word *cirrhoi* ?
 What of *tentacles* ?
 To what class of animals do *Barnacles* belong ?
 What is the meaning of the term *Cirrhopoda* ?
 What did the ancients believe of the barnacle ?
 What is it called *Anatafera* ?
 Describe the first stage of the animal ?
 What do you understand by *pedunculated* ?
 What are the two kinds of barnacles called ?
 What do you understand by *sessile* ?
 What are the habits of the barnacles ?
 To what class of animals do the *Cuttle-fish* belong ?
 What is the origin of the term ?
 What is the scientific name of the common cuttle-fish ?
 From what is it derived ?
 What are common names for the same animal ?
 Can you describe it ?
 What is related of the *Octopida* ?
 What is *sepia* ?
 What is the Latin name of the common *Sepiola* ?
 What of the official cuttle-fish ?
 What is *pounce* ?

What is said of the structure of the *Sepeida* ?
 What are the eggs of the cuttle-fish like ?
 What animals are spoken of as nearly related to this ?
 What are the *Star-fishes* scientifically called ?
 What is the derivation of the term ?
 What do fishermen call the commonest British species ?
 Why do they so call it ?
 What is its scientific name ?
 What that of the *Sun-star* ?
 Can you describe this ?
 Describe the *Brittle-stars*.
 Why are they called brittle ?
 What scientific name do they bear ?
 To what group do the *Sea-urchins* belong ?
 What do naturalists call them ?
 Which is our commonest species ?
 What is its Latin name ?
 What does this mean ?
 What are *Jelly-fishes* like ?
 What is said of the *Acalepha* ?
 Why called *phosphorescent* ?
 Describe the appearance of the sea when so lighted.
 What is *luminous* ?
 What are the jelly-fishes sometimes called ?
 What is *microscopic* ?
 What are the larger jelly-fishes sometimes called ?
 Why ?
 In what form are the young produced ?
 What does *gemma* mean ?
 What are *Polypes* ?
 What are their habitations ?
 Describe a familiar species.
 What is said of the coral polypes ?
 What lesson do they teach ?



SECTION VI. *Sea Weeds, Sea Birds, etc.*

WE have spoken about many things pertaining to the sea—of the mighty deep itself ; of the boats and ships that float upon its surface ; of the sailors who navigate them ; and of the fishermen who spread the net and cast the line, and haul the dredge, to ensnare the finny and other creatures, so numerous and wondrously fashioned, which haunt the sandy tide-pools and rocky hollows near the shore, or deep sea-caves, forests, and gardens—for let it not be supposed that the ocean has not these as well as the land.

Yes ; plants, as variously formed and as beautifully tinted, grow and flourish in these sub-

marine depths, where the foot of man has never trod, as in the green meads and shady forests, or cultivated enclosures where he is accustomed to walk, and admire the beauties of the vegetable world spread out before him. Down, far down, where the bright sunshine never penetrates, and only a dim faint light is diffused around, there are plains covered with waving herbage, on which, instead of flocks and herds, the finny creatures sport, and shelly molluscs feed. There, too, are mossy banks all gemmed with ocean flowers, and upland slopes and hills, clothed with thick vegetation that resembles a tangled forest, amid whose arches and dim recesses no dappled deer go bounding, amid whose upper boughs no sweet birds build and sing; but there, too, glide the bright-scaled fishes, flashing and gleaming in the shade, and there cling to the brown, and green, and crimson branches, or fronds, as they are more properly called, countless numbers of marine snails, with variegated shells, and banded slugs, and worms in shelly tubes, and other creatures of every conceivable shape, and size, and colour; wheels, and pyramids, and globes, and snake-like forms, *whirling* and twisting, shooting up and down, *darting* hither and thither, with all kinds of mo-

tions, regular and eccentric—that is, irregular. Oh, what strange sights and scenes must those ocean depths present; strange and startling as the wildest dreams of an excited imagination, wondrous as the stories of Eastern fable.

Those who have seen the marine aquarium, or glass water-tanks, wherein living marine animals and vegetables are kept, at the Zoological Gardens and elsewhere, may form some idea of the wonders of the deep; but, after all, it can only be a faint one, falling far short of the reality, for want of space wherein to exhibit creatures and plants of monstrous shape and growth. There must be a want of extent and variety, and of the impression of perfect freedom, without which all natural scenes and objects are viewed at a great disadvantage. Nevertheless, we may there behold some of the most elegant, and graceful, and richly tinted of the marine plants—sea-weeds, as we commonly call them—in a more perfect and natural state, because alive and growing, than they can be seen elsewhere.

Here, on this wave-beaten shore, it is true we may meet with nearly all kinds of sea-weeds—at least of such as are native to the *British seas*; but they are very commonly torn

and injured by the rough usage they have experienced, and often shrivelled and faded by the hot sunshine, so as to be useless as specimens. Some there are, and not the least beautiful either, which may be plucked from the rocky hollows and tide-pools of the shore, and these will well repay the trouble of gathering and preserving, if it is only for the sake of their lovely appearance, when dried and pressed, and fastened to clean white paper, and not for any purpose of scientific study.

Such of our readers as may be inclined to make a collection of this sort, should search well in the spots we have indicated, detach the specimens carefully from the stones or pieces of rock to which they adhere, carry them home in a moist state, wash them, and place them in fresh water, in shallow vessels, at the bottom of which are sheets of white paper; lift up the paper gently, so as not to turn it, allow the water to drain off, then place it on some folded linen; set out the specimen in as natural a manner possible, by means of a small camel-hair brush; then place over it two or three thicknesses of blotting-paper, and put it under *a heavy weight*, with other specimens. Change *the linen* and blotting-paper every other day or

so, until the weeds appear perfectly dry ; then fasten them down to fresh sheets of white paper, by means of isinglass or gum arabic.

Charming little groups may be made in this way, of different kinds of plants, by one who has any taste in the arrangement. Thus may these common sea-weeds be made to minister to the intellectual pleasure, as well as to the instruction of man. But not only are they ornamental, not only instructive ; they are very *useful* in many ways, as we shall have occasion to notice in the short account which we now proceed to give of them.

All SEA-WEEDS belong to that class of plants which botanists distinguish by the term *Algæ* ; therefore, one who makes a study of them is termed an *Algologist*. Land plants derive their nourishment in a great measure from the earth, therefore they have mostly large spreading roots, penetrating far down, and covering a considerable space ; the nourishment of ocean plants is derived from the water amid which they live, and is taken in at the stems and fronds, hence their roots are not fibrous or stringy, except in some few instances, in which this formation is required to secure their hold of the rock, or to penetrate a sandy bottom ;

but simply conical, or cup-like. The usual classification of sea-weeds by botanists is into three principal groups, or divisions; each of these groups contain several families, each family is divided into distinct genera, and each genus into many species.

About three hundred and seventy is the number of the British species, belonging to one hundred and five genera; some of these are extremely minute, and it requires a microscope to show their peculiarities of structure. There are some of these microscopic plants that go floating and quivering about in such a manner, that one is puzzled to say whether they be plants or animals; even as there are some marine animals, such as the *Actinæ*, or Sea Anemones, that so closely resemble plants, that their proper place would almost seem to be in the vegetable world. To this world it was once generally thought that the sponges belonged, while the jointed corallines, now proved beyond doubt to be of vegetable growth, were considered to be, like the true corals, the abodes of sea-worms, or polypes.

But let us speak of the great group of sea-weeds called *Chlorosperms*. The word comes from the Greek, and signifies green, that being

the prevailing colour of the plants included in this division. These green weeds are the simplest of structure, and the least varied in form of any; they may be observed about high-water mark, making the large boulders and smooth rocks slippery with their moist covering of slender grass-like filaments, or waving their silky fronds about in the clear tide-pools. It would be useless to attempt a description of the different species here, or to trouble our readers with their long scientific names, which are mostly of Greek origin.

Those called the *Ulvæ*, or Lavers, are among the commonest found upon our shores; of these we have several species, all remarkable for their flat transparent leaves, which are so delicate of texture that it is almost impossible to gather, without tearing them. The edges of the fronds of these plants are beautifully curled and wrinkled, like a lettuce leaf, hence the name Lettuce Lavers, given to some species; they are found chiefly in tide-pools and rocky hollows, where, with every motion of the water, they wave backwards and forwards in a very graceful manner, like so many fans moved by invisible hands. The bright green colour of some changes, when they are fully grown, to a

dull purplish tint, which is owing to an immense number of little dots of that colour, with which the transparent fronds are sprinkled over; these are, no doubt, the *sporules*, or seeds of the plant. One species, especially remarkable for this change of colour, is hence called the Purple Laver; it is often found on exposed rocks, near low-water mark, and is sometimes termed the Cleft Porphyra, the fronds being rather deeply cloven or divided.

These Lavers, like many other kinds of seaweed, are frequently eaten as a salad, and are perhaps beneficial as a medicine to some constitutions. They sometimes grow to the length of eighteen inches; if exposed much to the sunshine, they lose their beautiful bright green colour, and look pale and faded. The Common and Lineal Porphyrae are two remarkable plants of this class. The first is very abundant on the Scottish coasts; the fronds are commonly from one to two feet long, and two or three inches wide: the second is found chiefly about our western shores, near Sidmouth, in Devonshire. It is a small, neat-looking plant, with delicate green or purple fronds.

Equally common are the Compressed and Intestine-like Enteromorphae, the first of which

has fronds from six to twelve inches long, some of them as fine as a hair, and some half an inch wide, according to the age of the plant, or the situation of growth; these fronds, which are like flattened tubes, are divided nearly, but not quite, to the roots. The second species, which is found in brackish ditches, as well as on the sea-shore, has fronds each of which is distinct quite from the root; they are often more than two feet long; when young, of a bright green colour, but fading off, as age advances, to a yellowish tint, and eventually becoming nearly white. Then we have in this class a very curious plant called the Woody Codium, which has stout cylindrical fronds, much branched; these are of a bright green colour and a spongy texture, and are covered with a whitish down, composed of innumerable silky filaments. A microscopic examination shows these fronds to be composed of what look like small threads, woven and matted together. This plant is also found in the Atlantic and Pacific Oceans, as well as in the Indian seas. Very different in appearance, although closely allied to it, is the Feathery Bryopsis, a most elegant little plant, not uncommon in the rock-pools of our shores; *its small branching fronds look like a number*

of silky green feathers attached to slender stems. The beauty of this species may be looked upon and admired away from its ocean home, as it will readily grow in the aquarium, or even in a bottle of sea-water. These are among the most remarkable of the green plants common to the British coast.

We will now speak of the *Melanosperms*. The term comes from two Greek words, signifying *black* and *seed*, the spores and seeds of these plants being of a dark colour, as are also the fronds, varying from a pale olive to a deep dull brown, approaching very nearly to a black. In this class we find the largest and commonest of the British *Algæ*, such as the *Fuci*, of which waggon-loads may be, and are gathered on any exposed shore and tidal river-bank; we see them spread out for miles along the beach, drying and blackening in the sun, and all about the piers and buttresses of bridges, and the piles of jetties and harbours, they float and cling in tangled masses, showing how profuse and luxuriant must be their growth in the depths from which they have *been* uprooted by the winds and waves, tossed and hurled into tempestuous motion.

Of the family of Melanosperms called Fuci,

there are six British species, two of these are rare, and need not be described; the smallest of the four which are common is called the Channelled Fucus, from the form of its stems and branches; it grows in scattered tufts, about high-water mark; it is seldom found submerged to a greater depth than three or four feet, and seems to require a considerable amount of sunshine. Cattle are fond of browsing upon this species, which bears pods in pairs, at the ends of its branches. The Knobbed or Knotted Fucus is a tough leathery plant, with stems like whip thongs, which swell out every here and there into air-bladders; these, if thrown into the fire, burst with a loud report. They are sometimes as much as an inch and a half long, and are called Sea Whistles by the children, who use them as instruments of sound; being susceptible of a fine polish, they are also threaded into necklaces, and used as beads; their utility to the plant is no doubt, by their buoyancy, to sustain the fronds, which in deep water sometimes measure seven or eight feet in length. In Norway they call this plant Knop Tang, and in the Orkney Isles, Yellow Tang, on account of the orange-coloured pods which it puts forth on little

footstalks, at certain periods of its growth. The Bladder Fucus is the most common of all our sea-weeds; as we walk along the shore and tread upon it, *crack! crack!* go its oval bladders, which are more easily broken than those of the former species. Bladder Wrack and Sea Ware are common names for this plant; it was formerly called Sea Oak; the Scotch term it Kelp Ware, or Black Tang. It grows in large patches, between high and low water mark, and has a kind of forked leaf, with what is called a midrib, that is, a rib running up the centre. This plant is much used as manure for the land, on account of the immense quantities of it procurable; in some parts of Ireland, it is the only manure which the poorer cultivators can obtain. In Gothland, it is boiled and mixed with meal, and given to cattle; in the north of Europe they dry it for fuel. It yields a valuable medicine called iodine; and kelp, a mineral salt much used in the manufacture of glass and soap: so that we see this common sea-weed is a good friend to man. Although we tread on it, we may not despise it, but regard it as *one of the many proofs which are everywhere around us that God has made nothing in vain.*

All the members of the *Fuci* genus possess pretty much the same properties, and are thus useful in proportion as they are plentiful. One common species, of which we have not spoken, is the Saw-leaved Fucus, or Prickly Tang, distinguished by the toothed margin of its fronds, and the absence of air-bladders; it often covers the rocks down to low-water mark, and on its fronds, varying in length from two to six feet, may be found little thread-like coral-lines, and tiny marine animals, that find pasturage and protection there; not so wide and ample, however, as that afforded by another family of *Melanosperms*, called *Laminariæ*, or Oar Weeds, which may be termed the giants of the marine flora, sometimes measuring, in our climate, more than twelve or fourteen feet in length, while in southern latitudes, they grow to twenty feet and upwards, having huge bunches of leaves, which spread out to an equal extent on every side. One species is even spoken of as measuring seven hundred feet, rising from a great depth, and extending far along the surface of the sea, supported up by its numerous air-vessels; quite a plain for the small marine animals to sport on.

Sweet and Digitate, or Fingered Lami-

nariæ are the two species of this genus most common on our shores; the former is called by fishermen Sea Belt, and is sometimes boiled and eaten; when washed and hung up in the sun, it becomes covered with a sticky substance, which partakes of the nature of sugar, hence its name *sweet*. The second-named species is often called the Tangle, or Fingered Oar Weed; it is also known as the Sea Girdle and Sea Hanger; in Scotland they call it Red Ware and Sea Wand. It is not many years since that the cry, "Buy dulse and tangles," resounded through the streets of Edinburgh, this marine plant, with another called Pepper Dulse, which will be noticed presently, having been used as table vegetables. These Oar Weeds, like the *Fuci*, are useful for a variety of purposes. The species of which we have last spoken has stout cylindrical stems, which are frequently very thick, and several feet long; a spreading root with many fibres, and flat fronds separated into a number of narrow ribbon-like segments; this, as well as the Sea Belt, is frequently taken to hang up in the house, as a sort of natural barometer, or *weather glass*, showing with great certainty *when the atmosphere is moist*, by its damp

flaccid appearance. All sea-weeds will do this to a greater or lesser extent, on account of the saline, or salt particles which they contain, and are greatly affected by atmospheric influences.

The Bulbous Laminaria is another species of Oar Weed sometimes met with on the shores of this country; after storms, it is frequently thrown up in immense quantities. It is the largest native species; the short thick stem, with bulb-shaped root, and stout ribbon-like fronds of a single plant being sometimes a good load for a man; the fishermen call it Sea Furbelows, or Furbelow Hangers. It grows only in deep water, and contains much iodine. In the Orkney Islands, where it abounds, it was much used to supply the kelp furnaces. The Esculent Alaria, called in Scotland Badderlocks and Henware, or Honeyware, and in Ireland, Murlins, also belongs to the Laminaria tribe; this, too, is a deep-water plant; it abounds on those parts of our coasts washed by the North Pacific and Atlantic Ocean. It has a thin pale green frond, which grows from one to several yards in length. It is distinguished from the Oar Weeds by the midrib, which, with a number of small leaflets growing out of the stem, is eaten by the Irish people.

The Spiny, Strap-leaved, and green *Desmarestia*, so called in honour of a French naturalist named Desmarest, are known to most collectors of British sea-weeds; the first has branches delicately feathered, and all these are elegant and graceful plants. But the most beautiful of all the *Melanosperms* is, undoubtedly, the Peacock's Tail, called by old writers the Turkey Feather. The frond is narrow at the base, but gradually expands into a fan-like shape; it is usually deeply cleft, or divided, and the several portions are much curled, or rolled up, so as to resemble inverted cones, or extinguishers. The colour of the frond is a pale yellowish green, marked with rays of a deeper shade; it is also fringed with delicate hairs, which decompose the rays of light, and reflect all the tints of the rainbow. It is not common, but has been found on the Scottish coasts, as well as on those of Kent, Sussex, and Devonshire. This plant belongs to the family called *Dictyota*, and it has a near relative still more beautiful than itself, whose name is the Dichotomous *Dictyota*. This will give our readers some idea of the long and imposing names which these sea-weeds bear; very difficult to the learner, no doubt, but quite simple to the

man of science, who knows the languages from which they are derived. For instance, *dictyota* signifies a net, *chorda*, a chord, or line; *cladostephus*, a branch and crown; and all these are generic names of sea plants, expressive of some peculiarity in their shape or structure. Each of these genera have their representatives in the British marine flora; of the first of them we have just spoken. The Sea and Jointed Whiplashes, and the Whipcord Fucus, belong to the second genus; while of the third, we have the Whorled and Sponge-like Cladostephus. The names of all these sufficiently express their several appearances.

We must now pass on to the *Rhodospirms*, or Red Sea Weeds, which are truly described by a celebrated algologist, named Dr. Harvey, as "by far the most numerous in species, the most beautiful in form and colour, and the most perfect or elaborate in structure of all the class Algæ." Let us briefly notice a few of them. Growing mostly in deep water, from whence they can only be obtained by means of the dredge, unless thrown up during storms, in which case they are usually much torn, these delicate *Florideæ*, as they are sometimes called, are not generally so well known as the green

and olive weeds; some of them are exceedingly minute, so that they look to the naked eye like mere stains on the rock, or bright velvety patches. It is a curious circumstance, that the colour of these plants becomes deeper and richer in proportion to the depth at which they grow; those which have the least sunshine exhibiting the most glorious tints of crimson and purple.

One of the loveliest of these *Rhodospirms* is the Red Dock-leaved, or Blood-coloured Fucus; its nearly transparent fronds, crossed by crimson veins, are of a fine rose colour, and they wave gracefully to and fro in the clear water, with a gentle fanning motion; their length is about five or six inches, but they appear much larger, on account of the magnifying power of the fluid. If properly managed, this plant will preserve much of its beauty in a dried state; the great difficulty is to obtain its delicate fronds uninjured: the genus to which it belongs is called *Delesseria*, in honour of Baron Delessert, a French naturalist. The other species with which we are best acquainted are the Red Oak-leaved Fucus, and the Winged and Ploriferous *Delessariæ*, neither of which is so brilliant in colour as the one first described.

Of the genus *Callithamnii* are several very elegant species, whose slender pinnated—that is, feathered—fronds, when laid out upon paper, resemble beautiful tracery work. In the mud, at the base of harbour piers, and other places, where deep water occurs close to the shore, may these plants be found; some of the most charming specimens being often washed out from handfuls of mud, which merely exhibit, when taken up, a few red filaments. The Palmated Rhodomenia, or Dulse, as it is commonly called, is a plant of a totally different growth and aspect; it sometimes assumes a singular and by no means an elegant shape, having for its centre piece an irregular oval, out of which spring, on either side, a number of palm-shaped leaflets, on slender stalks. It has been compared, when laid out on paper, to “a sprawling insect, with a small body and large limbs.” The Gaelic, or ancient Scottish name for it was *duillisg*, meaning “leaf of the water.” It was at one time much used as an article of diet; and is still, to a considerable extent, on the sea-coast of both Scotland and Ireland, as well as in the north of Europe. Besides this palmate species, which the Icelanders call Saccharine, or Sugary Fucus, there is the Ciliated Rhodo-

menia, frequently found on our shores; this is fringed with fine cilia, or hairs, round the margins of the fronds, which are usually of a deeper crimson colour than the Palmate, which it otherwise closely resembles.

The Pepper Dulse, which belongs to a different genus, and is one of the most common of our native sea-weeds, is found growing in crowded tufts on the sides of the rocks, varying from an inch, to a foot or more in height; it is of slender make, and much branched, the projections having blunt terminations, as if they had been broken off; the colour varies from a yellowish, to a deep purple-red; the variations being, no doubt, caused by the different degrees of light to which it is exposed.

Some of the most lovely shapes and colours which marine vegetation exhibits may be seen in plants of the genus *Griffithsia*, so named after Mrs. Griffiths, of Torquay, in Devonshire, a lady who has done much to discover and explain the habits and modes of growth of British sea-weeds. There are about thirty species included in this genus, but a great many of them are foreign. Some of them have attracted the attention of scientific men, especially on account of the extraordinary

produced by their immersion in fresh water, when a series of crackings, or explosions, take place, the contents of one joint of the frond rushing into the next, or escaping from rents in the side into the surrounding fluid. The jointed stems of these elegant *Griffithsia*, swelling out into little globes, and delicately fringed, resemble crimson or pink beads threaded upon feathers; they are found chiefly on the southern shores of England.

The same remarkable phenomenon as that mentioned above, has been observed in the Dotted Nitophyllum, a plant whose delicate transparent fronds spread out round a central stem; these fronds, which are extremely fragile, are covered with little dots; it can seldom be obtained and preserved in a perfect state. The generic name means literally "shining leaf." The Lacerated Nitophyllum is another species of the same genus of plants, which is by no means rare on our shores; its deeply indented fronds have a ragged appearance, as if torn, hence its name.

One of the commonest and most useful of British *Algæ* is the Carrageen Moss, as it is called, whose generic name is *Chondrus*. It may be found on all parts of the coast.

where there are rocks, about which it grows in handsome tufts and clusters; it is also washed up in great quantities by the waves. It has several distinct fronds, of a tough, leathery texture, and generally of a purplish brown colour, growing out separately from one root; towards the upper part they spread out greatly, and are divided into many portions, of jagged irregular shapes, frequently twisted in various directions, hence a common name for the plant is the Curled Chondrus; both this and another species, called the Mamillöse Chondrus, almost equally common, are sold by druggists under the name of Carrageen or Irish Moss, producing, when boiled, a very nutritious kind of jelly. The great variety of shapes as well as colours assumed by the *Chondrus* have obtained for it the name of the Proteus of the marine *Algæ*. It is sometimes found bleached by the sun perfectly white, and of every intermediate shade between that and dark purple; often, too, with a tinge of green. It is of a species of *Chondrus* that the edible birds' nests of the Chinese are made; these are sold at a high price, and to procure them from the rocky caves of the sea-shore men often risk their lives.

But space would fail us to describe all the various Rhodosperms which are found on our shores, and in the marine herbarium—that is, collection of dried sea-weeds; just a few more of the most remarkable let us particularise, before we conclude this section of our book.

First, there is the strong-jointed Coralline, which seems to form the first link of the chain which connects animal and vegetable life together. It is of a delicate form, much branched, and the fronds are covered with a calcareous, or chalky crustation, whose roughness gives the plant much the appearance of a true coral; but the absence of polypes, and the fact of its yielding sporules, or seeds, leaves no doubt as to its vegetable nature. It grows plentifully at the bottoms of tide-pools, and its feathery sprays of lilac, pink, or reddish ash colour, are found in greater perfection the nearer we approach to low-water mark. There are other species of Corallines among our sea-weeds, but they are imperfectly known, and can scarcely be spoken about positively.

A most lovely little plant, of quite a different genus, is the Feathery Pilota, whose fronds resemble real feathers, being thickly set with little *pinne*, or rays, seated opposite each other;

the colour varies from a pink to a deep purple, and the size from an inch or two, to a foot in height. This species is frequently found attached to the Tangle, and other large weeds on the shore. We may often observe the rocks, at the margins of the tide-pools, stained a deep purple, approaching at times nearly to blackness; this is caused by the Horny Gelidium, which is common on most rocky coasts of Great Britain and Ireland. Equally, if not more generally distributed, is the rough-stemmed Scarlet Dasya, which grows from two to six inches high, and has fronds of a dull pink, changing, on exposure to the sun, to a rich crimson. The beautiful red Ceramium, whose pale pink fronds look like a bunch of silky hairs, is also common; as is another plant of the same genus, called the Ciliated Ceramium, the latter of which is often found attached to corallines; it grows in tufts about two inches high, and is of a bright red colour, sometimes deepening into purple; its stems are much jointed, and the joints are set round with tiny spikes, as though to guard its delicate structure from injury. The generic term *Ceramium* signifies a pitcher, and the branchlets of this species

curl into a variety of curious shapes, some of which might have suggested such a title.

The Hair Flag, or common Landscape Weed, is the last which we shall notice ; it resembles a miniature tree, and unless seen through a microscope, shows not half its beauties of construction. In many representations of shells and other marine productions, we see this plant flung over a portion of the picture, like a ruby network. And what more beautiful than a collection of ocean flowers, interspersed with pearly and richly-tinted testaceans and crustaceans, and gold and silver scaled fish, and scarlet-crested worms and phosphorescent Medusæ, and all the wonderful and beautiful creatures which inhabit the deep sea, and fill the minds of those who thoughtfully examine them, with an overwhelming sense of the power, and wisdom, and goodness of the great Creator of all things.

SEA BIRDS.

The *Natatores*, or Swimming Birds, are those which are most characteristic of the shore ; they have, generally speaking, plump full bodies, short legs, and webbed feet—that is, having the

toes joined by a thin skin or membrane, so that when spread out they can be used as paddles to propel their owners through the water. These Swimmers form a very extensive group of birds, which is divided into many families, at the head of which may be placed the *Anatidæ*, or Ducks and Geese; they mostly dwell and breed in high northern latitudes, where the cold is intense, and in the winter they fly southward in quest of food and shelter; then it is that they visit our shores in vast flocks, some remaining near the coast, and others going far inland, to rest awhile amid reedy fens and marshes, by lakes and rivers, where they can procure suitable food, in the shape of green herbage and the tender shoots of plants, which grow on land or in the water. Many of them prefer fish, and feed on that chiefly, when they can get it; they are also, the ducks especially, fond of snails and other molluscous animals, and they generally manage to procure a sufficiency of food, so that when shot they are in good condition for the table.

Some species remain with us all the year, *others only* during the breeding season, and *others only* visit us in exceedingly severe weather. One of the commonest of those

chiefly haunt the coast is the SHELL-DRAKE, or, as some call it, the SHIELDRAKE, which, on account of its frequenting sandy places, and building its nest in old rabbit-holes, has been called the Burrow Duck. This is a handsome bird, with glossy green head and neck, having a white collar, a bright red bill, flesh-coloured legs, and a body prettily marked with chestnut, white, and black; the bill is remarkable for having a prominence above, near the base, and a stout hook at the extremity, which must be very useful in turning up mussels and other shell-fish, on which it chiefly feeds.

Similar to it in form, but very different in colour, is the BLACK SCOTER, whose sable plumage is generally unrelieved by any lighter tint, even the bill and legs being black. Many parts of the coast are frequented by this species in considerable numbers. They feed, like the Shell-drakes, on molluses chiefly; their flesh is oily, and has a strong taste of fish.

Of the MERGANSERS, a division of the Duck family, four species are found on our coasts; these differ from the rest of the ducks in having the bill of greater length and a more slender make; it is serrated, or toothed, along the edges, and hooked at the end; these birds have crests

or tufts of long feathers at the back of the head; their habits are very similar to those of the other sea ducks. The SMEW is the smallest and commonest species; it is an elegant bird, being white, with black and grey markings, having here and there a greenish tinge. The RED-BREASTED MERGANSER is a larger and more gaily coloured bird, having the head and throat of a rich metallic green, running off in a warm chestnut-brown; the rest of the body is white, with velvety black and brown bands and borders. The GOOSANDER is a yet larger species, found chiefly on the northern shores; in colour it somewhat resembles the one last described, although the tints are generally darker.

The GREBES and DIVERS, included in the family *Colymbidæ*, are distinguished from the other ducks by their long conical bills, and the position of their legs, which are set so far back, that when the bird is out of the water it stands nearly erect, which has a most comical appearance. The foot of the Diver is perfectly webbed, that of the Grebe only partially so, the toes being merely fringed with membrane. These latter have frequently a thick ruff of feathers round *the neck*; they congregate about the borders of

lakes, feeding on small fish and aquatic insects : the lively little DABCHICK is the smallest and most common of this genus. Of the true Divers, the GREAT NORTHERN DIVER is the largest and handsomest ; the neck and head are black, with a greenish lustre, and a sort of double collar of mottled feathers ; the upper part of the body is dark with white spots, and the under part white. This bird is a bold strong swimmer, following the shoals of small fish along the coast, and capturing them by diving often remaining under water for several minutes.

In the family called *Alcadeæ* we have those curious birds GUILLEMOTS, AUKS, RAZOR-BILLS, and PUFFINS, that collect in large flocks on the rocky islets and headlands of our northern and western coasts, and tempt the hardy and adventurous fowler to trust himself on a frail rope, by which he is let down the face of the frightful precipice, with the roaring sea beneath, to the clefts and ledges where they deposit their eggs, and rear their young, passing the greater part of their lives in swimming and diving after fish, or sitting perched in rows, or silent groups, as though deliberating upon some weighty and solemn affairs of state. These birds begin to

congregate about May, many different species mixing together, and making populous the rocky solitudes. They lay but a single egg on the bare rock, on which they sit unmoved through all dangers.

The FOOLISH GUILLEMOT is so called because it will rather suffer itself to be taken by the fowler, than desert its charge; the fishermen say that, when the young birds are able to leave the rock, they are carried down to the sea, on the backs of their mothers; certain it is that they are found there, swimming and diving, long before they can fly, which they never can do very easily or rapidly, having wings very short, and small in proportion to the bulk of the body. There is a queer, little, round, black and white bird, which belongs to this family; it is called the PUFFIN, or SEA PARROT, on account of its parrot-shaped beak. Here we find also the PENGUINS of the south, which produce the celebrated manure called *guano*.

Distinguished from the last-named family of birds, by their slimmer forms, more ample wings, and active habits, are three species which belong to the *Pelicanidæ*, or Pelican group; these are the CORMORANT, the SHAG, and the GANNET.

The first has a dusky blackish body, with lighter coloured wings, a yellowish face, and green eyes ; the bill is long and slender, and there is a crest on the poll. This is a solitary haunter of the rocky shore, and a most expert fisher ; it was formerly tamed in this country, and employed to catch fish for man. It has in China a near relative, which makes itself very useful at the present time ; a string is put round the neck of the bird, to prevent it swallowing the fish which it captures. The SHAG is much like the Cormorant in shape, but is smaller, and has plumage of a dark green colour, uniform throughout. The GANNET is of stouter make, with a large head, and broad conical bill, very sharp and strong ; the plumage is white, with black tips to the larger feathers, and lines about the face, which encircle the eyes like the frame of a pair of spectacles ; there is a buff tinge on the head and neck ; the naked skin of the face is bluish, and the eyes pale yellow. The Gannets are strictly marine birds ; they lay their eggs on tall cliffs and jutting rocks, making a rude nest of grass and reeds. In the Scottish isles they congregate in vast flocks ; twenty-two thousand of them, besides a countless

Kilda alone, without perceptibly decreasing their numbers. It is calculated that they destroy every year about one hundred millions of herrings. The Gannet's mode of taking its prey is very peculiar; it hovers over the surface of the sea until it espies a fish, then suddenly rises to a considerable height over the spot, and, closing its wings, drops down head foremost, with the speed of light, and seldom or ever misses the object aimed at. The down of this bird is very valuable; it is sometimes called the SOLAN GOOSE.

The GULLS, TERNS, and PETRELS belong to another group, called the *Laridæ*. All the species are strictly oceanic in their habits, some appearing to live almost constantly on the open sea, where they skim and glide about in a peculiarly easy and graceful manner, uttering their shrill cry, which sounds like something between a scream and a laugh, and heard in combination with the dashing of the waves and whistling of the winds, is by no means so inharmonious as, under other circumstances, it would be considered. The TERNS are sometimes called the SEA SWALLOWS, on account of their slender shape and rapidity of flight; like the GULLS, of which several species haunt our shores, they

are voracious feeders, seizing any animal substance, dead or living, which floats upon the sea, or is thrown up by the tide.

The KITTY-WAKE, so called from its peculiar cry, the SKUA, and the FULMAR, are all remarkable birds, each with some peculiar habit to distinguish it. The latter forms populous colonies on the remote western isles of Scotland, and is eagerly sought for by the islanders, for the sake of the eggs and flesh of the young birds, which they relish, notwithstanding its oily and fishy taste. The smallest web-footed bird known is a member of this family; this is the STORM PETREL, called by the sailors Mother Carey's Chicken, and looked upon with some degree of superstitious dread, as an omen of tempestuous weather; it is frequently seen far away from land, half flying, half walking upon the waters, on the watch for food.

Many other species of birds may be observed by the shore rambler, besides those properly called aquatic; but to give a description of all these would be like writing a complete bird history, or *ornithology*, as it is called, as there are few of the feathered inhabitants of these islands that do not occasionally visit the coast. As we walk along the

beach, or the level sand, we may often hear the shrill melody of the SKYLARK, singing high up in the sunshine, and if we pass beneath cliffs, the harsh *caw* of the CHOUGH, or CORNISH CROW, will, it is likely, grate on the ear, coming from some inaccessible cleft or fissure, wherein is built the rude nest of twigs, lined with wool or hair, and furnished with four or five dingy white-spotted eggs. In turning an abrupt corner, we may perchance come upon the solitary OYSTER-CATCHER, sometimes called the SEA WOODCOCK, and OLIVE, working away with its strong beak to detach the limpet from the rock, or open the shell of the mussel, or other bivalve. This is a beautiful bird, having glossy black wings, which contrast finely with the white plumage of the breast and under parts of the body. Its nest we should be likely to find amid the sea-weed, on some patch of sand above high-water mark, or beyond a bank of shingles; the eggs are four in number, of a pale olive-green, blotched with white. It may be that, while examining this, we shall be startled by the loud shrill whistle of the CURLEW, or the wailing note of the SANDPIPER, sometimes called the SEA SNIPE; these are what are termed Wading birds, having long legs, for the

most part free from feathers; they cannot swim, but wade far into the water in search of prey. Then there are the DUNLINS, or SHORE LARKS, which perform their evolutions with as much regularity as a regiment of soldiers; now we see them like a dark cloud, with their backs towards us, and anon we are startled, as by a flash of light, by the sudden turning up of their silvery under plumage; their note is low and gentle, and they build neat little nests among the coarse grass of the salt marshes, and lay in each five greenish-grey eggs, spotted with brown, tapering much at one end.

Of the vegetation which clothes these marshes, and borders the brackish ditches, and sends its creeping roots far down amid the sand and shingles in search of nourishment, and waves wildly in the gales which sweep across the lofty headlands, and hangs in wreaths and festoons down the sides of the chalky cliffs, we cannot here speak, although we hope to do so in a future work, of a similar description to the present. Many plants grow on, or near, the sea-shore which are peculiar to such situations, and many which are not, so that an account of them would be, indeed, one of a great proportion of the British flora. Neither can we en-

into a description of some other common sea-side objects, such as pebbles and boulders, sand and chalk, limestone and other rocks, and all those matters which pertain properly to the science called *geology*, as we wish not to perplex the minds of our readers with too many subjects at once. A little book well learned, is better than a big book, only imperfectly studied, any day, and we hope that our little book will be found both instructive and amusing.

QUESTIONS.

- | | |
|--|---|
| <p>To what class of plants do <i>sea-weeds</i> belong?</p> <p>What is one who studies them called?</p> <p>From what do these plants derive their nourishment?</p> <p>What kind of roots have they?</p> <p>Into how many groups are they divided?</p> <p>How many British species are there?</p> <p>How many genera?</p> <p>What is said of the <i>Actinia</i>?</p> <p>Have sponges animal or vegetable life?</p> <p>What are <i>Chlorosperms</i>?</p> <p>What is the origin of the name?</p> <p>What is said of the <i>Ulva</i>?</p> <p>Why are some species called <i>Lettuce Lavers</i>?</p> <p>What is the <i>Purple Laver</i> sometimes called?</p> <p>Why?</p> <p>What use is made of the Laver?</p> <p>What is said of the common <i>Porphyra</i>?</p> <p>What of the <i>Lineal</i>?</p> <p>Describe the <i>Compressed Enteromorpha</i>.</p> <p>What is the other species called?</p> <p>What is said of it?</p> | <p>Describe the <i>Woody Codium</i>.</p> <p>Describe the <i>Feathery Bryopsis</i>.</p> <p>What is the origin of the term <i>Melanosperms</i>?</p> <p>What is said of the <i>Fuci</i>?</p> <p>How many British species are there?</p> <p>Which is the smallest of the common species?</p> <p>What is said of it?</p> <p>Describe the <i>Knotted Fucus</i>.</p> <p>What are the bladders called?</p> <p>Of what use are they to the plant?</p> <p>What do they call this species in Norway and the Orkney Isles?</p> <p>Which is the most common of the <i>Fuci</i>?</p> <p>What is said of it?</p> <p>By what various names is it known?</p> <p>What are its several uses?</p> <p>What second name has the <i>Saw-leaved Fucus</i>?</p> <p>What is said of it?</p> <p>What is the generic name of the <i>Oar Weeds</i>?</p> <p>What is said of them?</p> <p>Which are the two commonest British species?</p> <p>What do the fishermen call the former?</p> <p>Describe it.</p> |
|--|---|

What are the names of the latter?
Describe it.

For what is it frequently used?

What species of *Laminaria* is next mentioned?

What is said of it?

What do the fishermen call it?

Where does it abound?

What are the names of the *Esculent Alaria*?

Where is it found abundantly?

What distinguishes it from the oar-weeds?

What parts of it do the Irish eat?

After whom were the *Desmarestria* named?

Which are the three common species?

Which is the most beautiful *Melanosperm*?

What did old writers term it?

Describe it.

Where has it been found?

To what family does it belong?

What does *Dictyota* signify?

What *Chorda*?

What *Cladostephus*?

To what are these terms applied?

What examples are mentioned of the second-named genus?

What of the third?

What are the *Rhodospirms*?

How does Dr. Harvey describe them?

Where do they mostly grow?

What are they sometimes called?

What is remarked of them?

Which is one of the loveliest?

Describe it.

To what genus does it belong?

Why so called?

What other species are common?

What genus is next named?

What do you understand by *pin-nated*?

Where are these plants often found?

What is the scientific name of the *Dulse*?

How is it described?

What is the Gaelic name for it?

What common use was it put to?

Where is it still so used?

What do the Icelanders call it?

What other species of the same genus is found on our shores?

Where does the *Pepper Dulse* grow?

Describe it.

After whom is the genus *Griffithsia* named?

How many species are included in this genus?

What is there peculiar about these plants?

Where are they chiefly found?

What other plant is in like manner remarkable?

Describe it.

What is the meaning of the scientific name?

What other species of this genus is mentioned?

What is said of it?

Name one of the commonest and most useful of British Algae.

What is its generic name?

Where is it found?

Describe it.

What other *Chondrus* is spoken of?

To what use are these put?

What has the *chondrus* been called?

Why?

What more is said of these plants?

Describe the *Strong-jointed Coralline*?

How is it known to be of vegetable growth?

Where does it grow?

What is said of the *Feathery Pilota*?

What do you understand by *pinnae*?

Can you describe this plant?

What is said of the *Horny Gelidium*?

What of the *Scarlet Dasya*?

What of the *Red Ceramium*?

What of the *ciliated* species?

What does the generic name signify?

What other name has the *Hair-flag*?

What is it like?

BIRDS.

What are the *Schmœding-birds* scientifically called?

What is their conformation ?
 What are their habits ?
 What are the *Anatida* ?
 What are their habits ?
 On what do they feed ?
 Mention one of the commonest.
 What other name has it ?
 Why is it so called ?
 Describe it.
 Describe the *Black Scoter*.
 How many species of *Mergansers*
 have we ?
 In what do they differ from the
 other ducks ?
 What do you understand by *ser-
 rated* ?
 What is said of the *Smew* ?
 What of the *Red-breasted Mer-
 ganser* ?
 What of the *Goosander* ?
 To what family do the *Grebes* and
Divers belong ?
 How are they distinguished from
 the ducks ?
 In what do the grebes differ from
 the divers ?
 Which is the smallest of the genus ?
 Which is the largest of the divers ?
 What is said of it ?
 What birds of the family *Alcedae*
 have we ?
 Where do they chiefly congre-
 gate ?
 What are their habits ?
 Why is the *Foolish Guillemot* so
 called ?
 What do the fishermen say of it ?
 What is said of the *Puffin* ?
 What birds belong to the *Peli-
 canidae* ?
 In what do they differ from the
Alcedae ?
 Describe the *Cormorant*.

For what was it form
 this country ?
 Where is it still so use
 In what respect doe
 differ from the *Cor*
 Describe the *Gannet*.
 What are the habits o
 How does it take its
 What is it sometime
 What birds are inc
Laridae family ?
 What are their habi
 What are the *Ter*
 called ?
 What is said of them
 Why is the *Kity-wal*
 Where does the *T*
 resort ?
 Which is the small
 bird ?
 What do the sailors
 Why do they look
 dread ?
 What sweet song-bir
 heard near the sh
 What kind of *Crow*
 cliffs ?
 What is the *Oyster*-
 times called ?
 On what does it feed
 Describe it.
 What kind of noise
lew make ?
 What the *Sandpipe*
 What other name h
 What are *Wading bi*
 What are the *Dunli*
 What is said of the
 What is better th
 imperfectly studi
 With what wish is
 concluded ?
 Will the writer have



THE NEW YORK PUBLIC LIBRARY
REFERENCE DEPARTMENT

**This book is under no circumstances to
be taken from the Building**

[illegible]



